

THE IRON AGE

New York, June 22, 1916

ESTABLISHED 1855

VOL. 97 : No. 25

A Notable Machine Shop of Moderate Size

A Plant at Hartford Designed and Equipped to Make Special Machinery and Fine Tools—Some of the Special Features

BY W. E. FREELAND

AMONG Hartford's excellent new factory buildings, of which several have recently come into being or are now under construction, may be numbered that of the Hartford Special Machinery Company. It is located between Homestead Avenue and the tracks of the Central New England Railroad. The main structure is 55 x 325 ft. in size. The

tion, and is protected against fire by a sprinkler system and the usual equipment of fire pails and chemical tanks. The windows have steel frames and are filled with hammered glass to give a diffused light, with the exception of the row of panes at the level of the workmen's eyes. This practice is becoming more and more common, as it has two



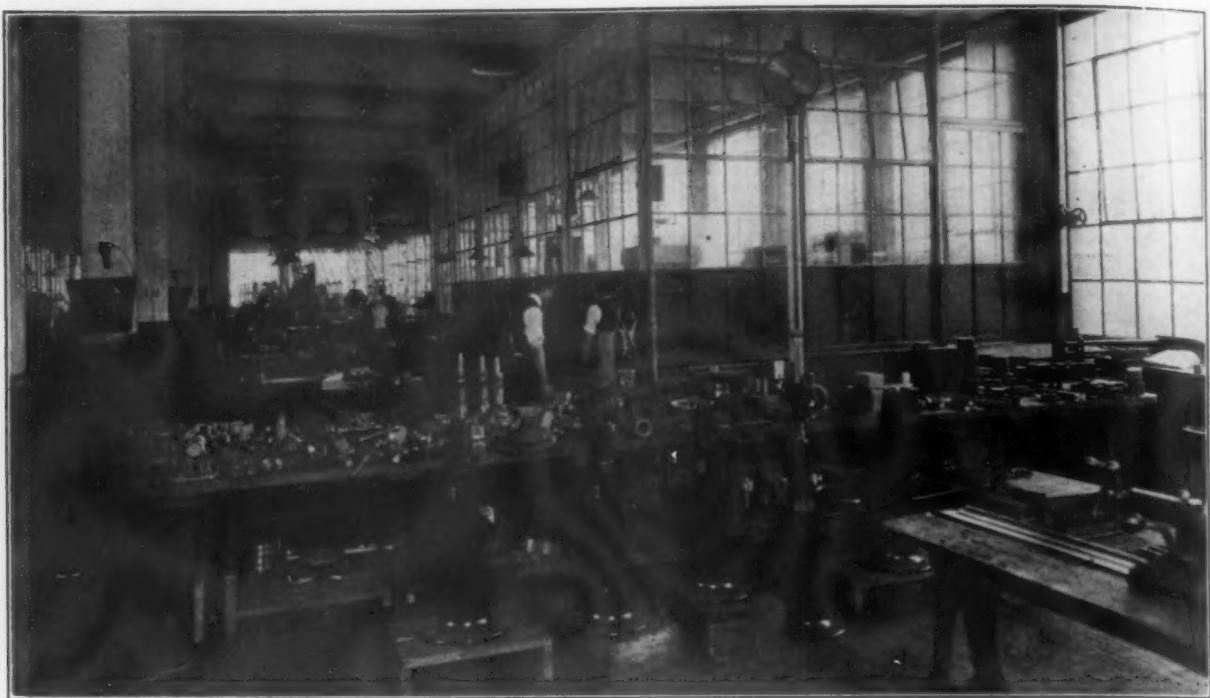
The Superintendent's Office Projects Into the Main Shop Floor and Is at a Higher Level, So that from His Desk the Superintendent Surveys the Entire Shop. The bench at the right holds a master set of drawings of all the work in operation. In the background is a passageway from the employees' door to the main shop floor. The time clocks are placed on the further wall

toilet rooms, boiler house and tool room project from one side of the main building, leaving the floor inside practically clear, the only exception being the superintendent's office, which is elevated above the main floor so that from his desk he can survey the entire factory. One end of the inclosure of the superintendent's office is at the main floor level. This is made into a passageway for the employees' entrance and the time clocks are attached to the office wall, and the workmen pass through directly into the machine shop.

The building is of slow-burning mill construc-

marked advantages: it removes any "prison" atmosphere and enables the workmen to rest their eyes by occasionally focusing them upon a distant object.

The plant is run by electric power. A low-pressure boiler is used for heating purposes. Heating coils are placed under windows. Two sections, about equidistant from the different ends of the plant, are equipped with individual wash basins with hot and cold water. The section of floor beneath is of concrete construction, arranged with a drain to a center outlet. The lighting is by 100-watt lamps in reflectors placed at intervals of about 16 ft.



The Benches in Front of the Superintendent's Office Are Used for the Distribution of Work, Each Job, Except the Most Bulky Pieces, Being Returned to These Benches After Each Operation. In this way all the pieces obtain some measure of inspection and special work goes to the inspector's tables at the right before being returned for further operations.

There are numerous drop lights in reflectors, these being placed wherever concentrated lighting of benches and machines is desired.

The shop is arranged for group drive with five motors: one of 20 hp., three of 15 hp. and one of 3 hp. There is also a small motor-generator set furnishing direct current for energizing magnetic chucks. A few of the larger machines, such as vertical surface grinding machines and turret lathes, are driven by individual motors.

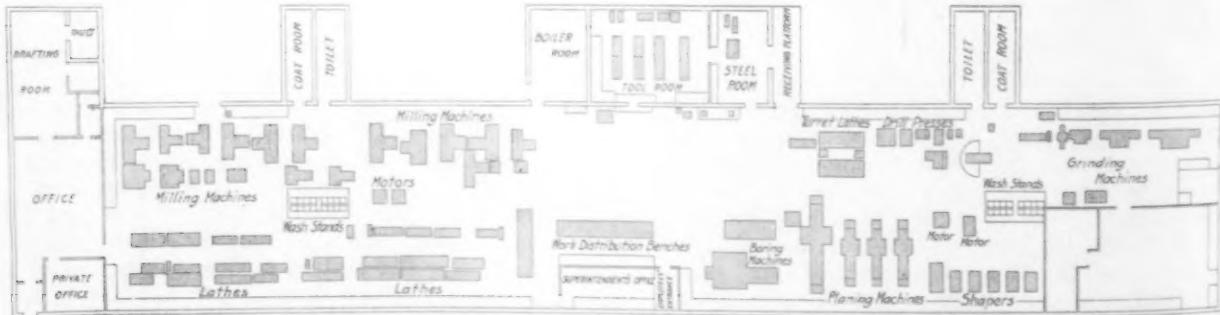
The tool room is located in one of the wings extending toward the railroad track. It is well laid out, and has a complete card system for perpetual inventory and for a directory of the location of tools and supplies. Near the delivery window is a large sheet upon which is a list for the quick location of small tools kept in drawers. All tools over \$3.50 in value are stamped with an individual inventory number. In the tool room is also kept a supply of oils. Adjoining the tool room is the steel room, where the raw stock is kept. It is equipped with the usual cutting-off machines. In front of the steel room are a hardening bench and hardening furnace.

The plant is, as one would expect in a shop of this kind, notable for its cleanliness. It is equipped with many waste cans, and one of the factors which serves to retain a man in its employ is the faithfulness with which he cleans his machine and the floor space about it. All the smaller details of the

modern factory have been especially well looked after in designing and equipment. There are drinking fountains scattered about, and each workman is supplied with a steel-frame stool. Much thought has been given to other small conveniences that help to make employment pleasant.

In front of the superintendent's office are three long tables used for the distribution of jobs. The work goes from these tables to each operator, and is then returned to its table after each operation, with the exception of the heaviest material, such as the bases of machines, etc., which are too bulky to be so handled. As most of the work of this shop is small parts, practically all work is handled directly from these tables. By this method a certain amount of inspection is given to each piece after each operation. The inspector's bench adjoins the distributors' benches, and work requiring close supervision passes through the inspector's hands before being placed on the table for the next distribution. A card system is in use to assist in the selection of jobs so that the work may be performed and the jobs delivered on the promised date and not lost track of through the selection of less pressing work.

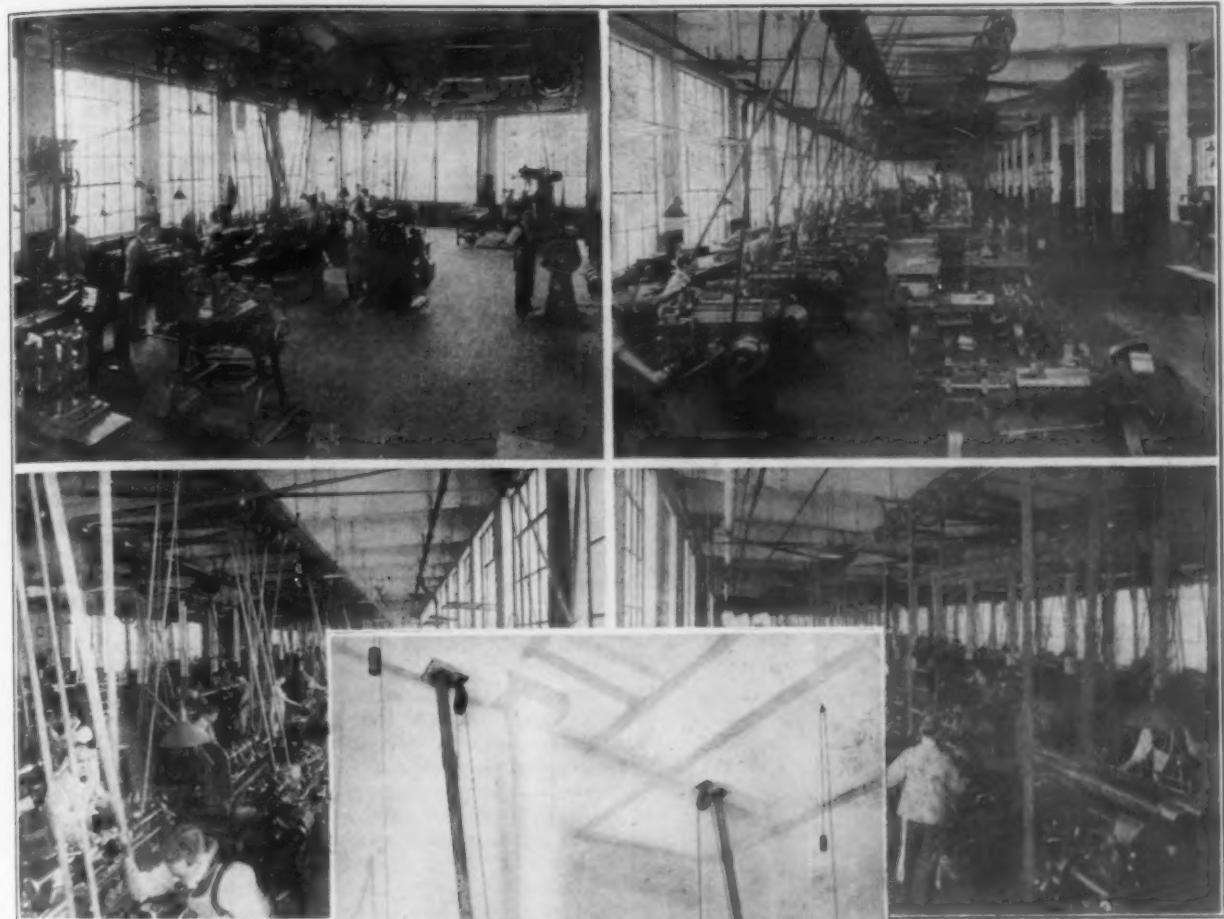
In reality this plant is something different from the typical machine shops found in most New England cities. It is in truth one large tool room. Even the most casual and untrained observer will note the intelligent appearance and unusual matur-



Machine Grouping in the Plant of the Hartford Special Machinery Company

ity of the workmen, and can hardly fail to observe both the fine appearance of the machinery and its diversity. As its name indicates, its principal product is special machinery, but during these rush days, when manufacturers everywhere are wondering where they can get good toolmakers, this plant

room from the machine shop. It imparts the atmosphere of a distinctly industrial, business-like office. It has the modern accounting, cost and inventory systems that are now so essential in a well-managed industry, and the improved office appliances that help to make the work both easier and more accu-

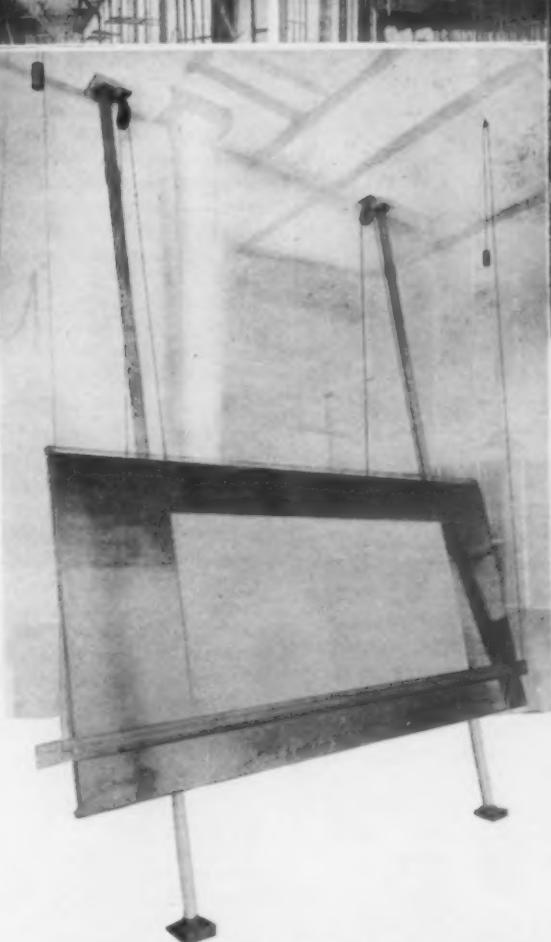


is extremely busy with tool work of the highest grade.

As the concern is not engaged to mass production, but is engaged in making the highest grade of special machinery and tools, one finds a high type of machinery throughout the plant, and it is a fixed policy of the company to discard any machine, even though it may have been in use only a few months, if a better machine for the same purpose is placed upon the market. One of its regular products, which will give a good idea of the character of the tools and machinery built in this plant, is shown in the foreground of the illustration of the distribution benches. It is a United States Bureau of Standards rubber-testing machine. It is upon special products of this class that the emphasis of the production of this plant is placed.

The attention of a visitor is quickly attracted to the office by reason of the steel and glass partitions which separate the offices and the drafting

The Milling Machine, Lathe, Shaper and Planer and Grinding Machine Sections. At the bottom of the group of illustrations is the drawing board in the drafting room used mainly for full size drawings



rate. In the drafting room there is a home-made and thoroughly practical drawing board for making full size drawings and sketches. An accompanying illustration shows clearly how its construction and adaptability for many purposes make it a notable addition to the drafting room equipment. Opening from the drafting room is a large vault for fireproof storage of valuable drawings, models, etc.

The Hartford Special Machinery Company was organized in 1912 to build machines designed by Joseph Merritt, who had been for many years in the business of special machine designing

in the city of Hartford. It was his belief that there was a constant demand for machine shop work which is made absolutely on honor. The company began business on one floor of the old Wood building, which has been the nursery of some of the present large industries of Hartford. In a short time it became necessary to take over another floor, and

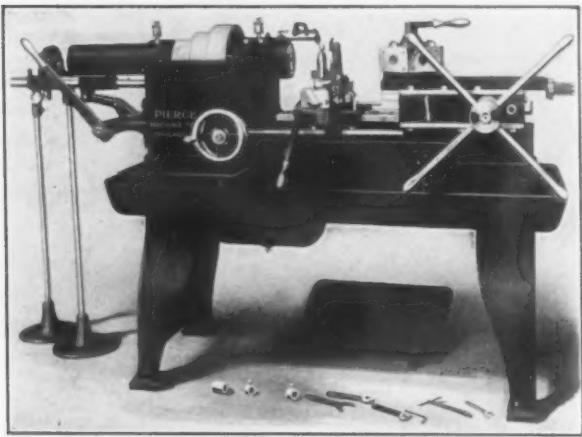
still the demand for space increased. So during the winter the shop here described was built and placed in operation. The present officers of the company are Ernest Walker Smith, president; Herbert Knox Smith, vice-president, and Joseph Merritt, secretary, treasurer and manager.

Plain Head Hand Turret Screw Machine

A 1-in. hand turret screw machine with plain head has been placed on the market by the Pierce Machine Tool Company, 617 West Jackson Boulevard, Chicago, Ill. The machine is somewhat heavier than others of equal capacity and has a one-piece bowl type headstock and special guards to prevent the splashing of oil on the floor.

The headstock is cast in one piece with the bed, an arrangement to insure strength and rigidity. The automatic chuck, which will handle round stock up to 1 1/16 in. in diameter, is forged solid on the end of the spindle with an external thread. The design also calls for a small amount of overhang from the front spindle bearing with a consequent reduction in the tendency toward vibration. Either plain, round solid collets can be used, or a master collet adapted for the use of hardened bushings can be furnished.

The cut-off rest, which has a longitudinal travel



A New 1-In. Hand Turret Screw Machine Equipped with a Bowl Type Headstock and Special Guards to Prevent Splashing of Oil on the Floor

of 8 1/2 in., has a large bearing on the bed. Hand longitudinal screw feed adjustment, arranged with micrometer dial and observation stops, is provided. The turret measures 7 1/2 in. across the top, and is arranged with a hole through the turret stem, thus enabling stock up to a maximum diameter of 1 in. to pass through. The turret locking bolt is fitted at the front end of the slide directly under the cutting tool and works in hardened and ground taper bushings located in the turret close to its periphery. Independent adjustable stops for each position of the turret face operate automatically and serve to disengage the positive geared power feed.

The following table gives some of the principal dimensions and specifications of the machine:

Diameter of hole through spindle, in.	1 5/16
Maximum length that can be turned, in.	8
Maximum distance between end of spindle and turret face with saddle flush, in.	16 1/2
Width of driving belt, in.	2 1/2
Number of cone pulley steps.	3
Diameter of smallest cone pulley step, in.	5 5/16
Diameter of largest cone pulley step, in.	9 1/2
Floor space required, in.	56 x 60
Net weight without power feed to turret, lb.	1,350
Net weight with power feed to turret, lb.	1,455

Other machines that are being manufactured by the company include a 14-in. heavy-pattern plain-head turret lathe, a 1 1/8 x 11 in. heavy-pattern friction back-gear head turret screw machine and a 5/8-in. bench type turret screw machine.

Lead-Plated Instead of Zinc and Nickel-Plated Parts

The substitution of lead-plated steel for zinc and nickel plated material and phosphor bronze, copper and brass parts used where metal must be protected from corrosion caused by acid, salts and fumes has been made possible by the development of a process for lead plating that is being used by the U. S. Electro Lead Plating Company, 1265 West Second Street, Cleveland, Ohio. This process was invented by J. E. Schmotzer, vice-president and manager of the company, at the plant of the Willard Storage Battery Company, Cleveland, with which he is also connected in charge of the plating department. The automobile has created a heavy demand for storage batteries, and the development of the new plating process resulted from efforts to reduce the cost of storage batteries by reducing the cost of plating the parts and at the same time making these parts more lasting. It is stated that the lead-plated parts now used are much cheaper than zinc or copper plated parts and the phosphor bronze parts formerly used, and that the lead-coated metal is superior to that coated with zinc in that it will not corrode so quickly. It is also claimed that the lead coating will not crack or come off unless it is cut off.

The Willard Storage Battery Company has equipped a large plating plant in which the new process is used for plating gray and malleable iron castings and steel stampings. From 15,000 to 20,000 parts are lead plated every day, these being used for battery handles, screws, top connections and terminals. The method of electrolytic plating used is similar to that employed in plating with zinc, nickel or copper, except that pure lead is used for plating purposes and different chemicals are used in forming the plating solution. This part of the process is secret, but a patent upon it has been applied for. A current of 2500 amp. is supplied at 6 volts. Large parts are plated in plating tanks and the smaller parts in rotating plating barrels having a capacity of 100 to 150 lb. each. The parts are left in the plating solution 20 min. for weatherproof coating and 3 hr. for acidproof coating. After they are plated they are cleaned, similarly to other plated work, with a solution of caustic potash and acid.

PLATING PARTS OF A LARGE BLOWER

The lead-plating work done by the U. S. Lead Plating Company includes foundry chaplets, clips for batteries to take the place of solid copper, and various other parts. Tests are being made in plating automobile rims, which are now galvanized. One of the largest pieces of plating work ever attempted has just been done at this plant—the lead plating of every part of a blower that is being installed in the pickling room of the Firestone Tire & Rubber Company, Akron, Ohio. This blower has a housing 48 x 120 in. and the blower itself is 72 in. in diameter and 33 in. wide, the blower and housing weighing 3 tons. Before plating the housing and blower were taken apart and the various parts were assembled after plating.

The use of metal in the building of farm structures in Wisconsin is becoming more and more common every day, says the Wisconsin *Agriculturist*, Racine. "As one travels through the country, he is now able to see barns supported by steel frames, or covered with galvanized steel sheeting, and equipped with galvanized metal ventilating systems. More than this, he also sees coming into more common use, here and there, hog cots, corn cribs, farm garages and sheds constructed entirely of galvanized metal sheeting. It is now possible for the farmer to procure an all-metal silo that will not corrode."

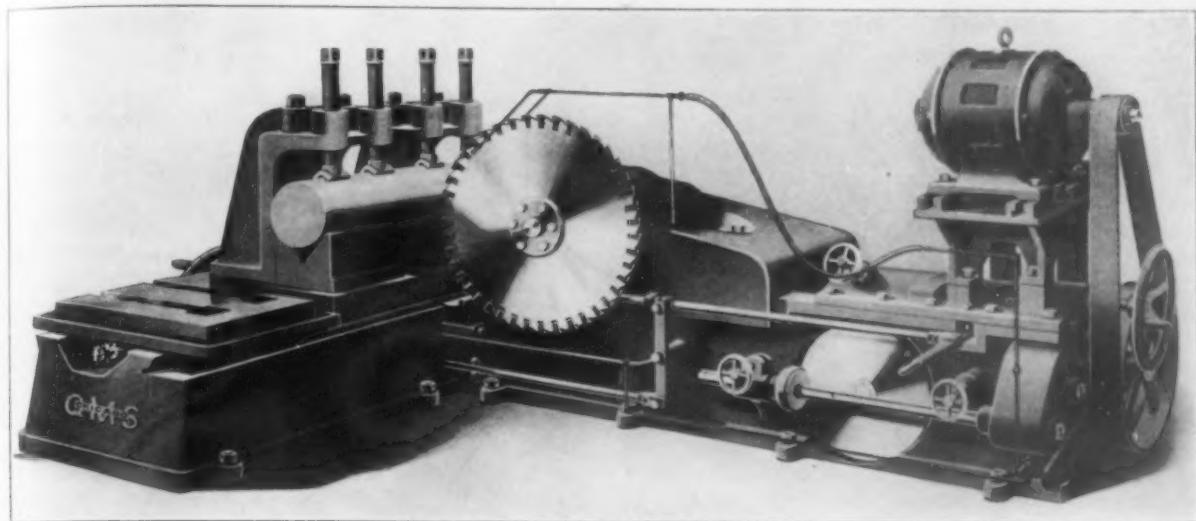
Galvanized corrugated sheet iron is a standard article in the Dominican Republic and is used almost exclusively for roofing as well as for sides of buildings, walls of inclosures, partitions, etc. Before the war Great Britain furnished most of this, but recently the United States has been the principal source of supply.

Large Increase in Coke Production

The coke made in the United States in 1915 amounted to 41,581,150 net tons, an increase, as compared with 1914, of 7,025,236 tons, or 20 per cent, and was within 5,000,000 tons of the record output of 1913, according to figures compiled by C. E. Lesher of the

A New Cold-Metal Sawing Machine

A number of improvements have been embodied in a new high-duty-type cold-metal sawing machine that has been developed by the Q M S Company, and is being marketed by the Vulcan Engineering



This New High-Duty Type Cold Metal Sawing Machine Is Equipped with a Raked Table and a Friction Device for Changing the Feed

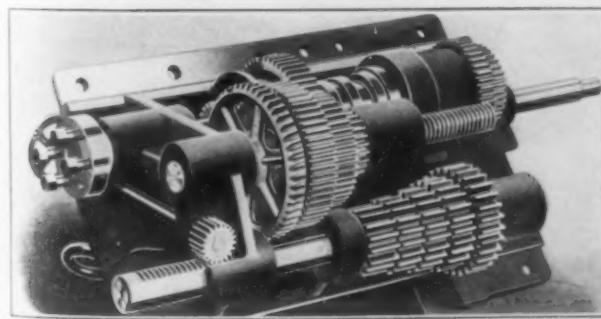
United States Geological Survey. Of this total 34 per cent, or 14,072,895 tons, was by-product coke, and 66 per cent, or 27,508,255 tons, was made in beehive ovens. The increase in the output of by-product coke in 1915 as compared with 1914 was 25 per cent, and in beehive 18 per cent. A feature of the year's record was that the quantity of by-product coke made in 1915 was the greatest yet recorded, exceeding the output of 1913 by 1,358,195 tons. The total number of by-product ovens in operation in 1915 was 5481, against 5142 in 1914. The number of beehive ovens in operation in 1915 was 49,540 as against 49,496 in 1914. The increase of 18 per cent in the production of beehive coke from practically the same number of ovens indicates more continuous operation during the past year. All States except Alabama, Georgia, Tennessee, Virginia and West Virginia, in the South, and Massachusetts in the North, had increased output in 1915.

Franz Krull, Ltd., of Reval, Russia, through its general manager, Maxim L. Kagan, who is here on Government business, has placed an order with H. L. Barnitz, sales agent of the International Oxygen Company, 115 Broadway, New York, for a large oxy-hydrogen plant of unit-type generators. The gases produced by this plant are to be used for welding and piped throughout

Sales Company, 2059 Elston Avenue, Chicago, Ill. Among the features are the building of the gear mechanism to a great extent into the cover to permit quick removal and ready access to the parts and the use of a staggered tooth construction of the saw and gear arbors to prevent chattering of the saw blade.

Hand adjustment, automatic stop and quick power return are provided for the carriage, and a spline shaft prevents the spline in the main or worm shaft from coming in contact with the bronze bearings. The main worm has a large diameter, and is made of hardened steel, with the end thrust taken by roller bearings. A two-piece construction, steel center with special composition bronze rim, is employed for the wormwheel which, together with the worm, runs in grease.

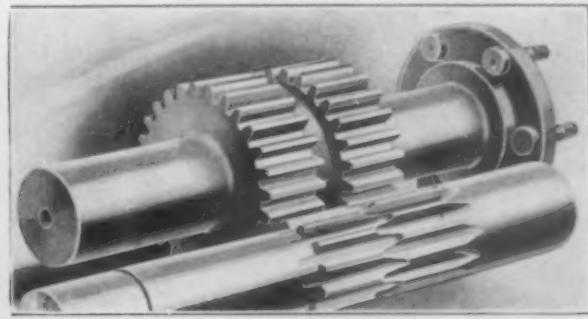
The arbors for the saw and its driving gear are of hammered, open-hearth, 0.60 per cent carbon steel. The teeth on both are cut from the solid and are staggered, this arrangement being relied upon to minimize backlash and the resultant chatter of the saw blade. Hard bronze bearings are provided for both arbors. The feed is obtained by a combina-



The Mechanism Is Largely Built into the Cover To Permit of Quick Removal and Ready Access to All Parts, and the Teeth on the Saw and Gear Arbors Are Staggered To Reduce Chatter

the works. Mr. Kagan recently placed orders for refrigerating machinery for the Russian Government aggregating over half a million dollars. He leaves for Russia shortly.

tion of a friction disk and gears, the range available extending from 5/16 to 2 1/2 in. per minute. The friction wheel is automatically kept in contact with the friction disk.



Building Interchangeable-Part Lathes

The Machining Practice of the Chard Lathe Company, Newcastle, Ind., in Producing a Line of 18 to 28 In. Engine Lathes

BY O. J. ABELL

TO say that the lathe is the most standardized of machine tools, in its functions, its design and its method of manufacture, excepting perhaps the upright drilling machine, is the veriest commonplace, yet that fact lends to designs, or characteristics, or machining practices that are different, their chief claim to attention. It is also a trite saying that if a lathe is a good lathe, it is because its proportions and adaptability meet the service requirements for which it is purchased and because the accuracy with which it is manufactured contributes to a long life at high efficiency with low maintenance charges. In accordance with this definition, claims made for the new lathe manufactured by the Chard Lathe Company, Newcastle, Ind., suggest the features of interest which are to be found in the manner of producing this tool.

Based on many years of experience in the building of manufacturing lathes, recognizedly standard in their construction, the designs of the Chard lathe were completed early in 1915. The company was organized at that time and its first product was ready for the market in May a year ago. The unforeseen and overwhelming demand for lathes arising about that time and continuing throughout the year, absorbed the output at the rate of thirty-five lathes per month, and in consequence retarded acquaintance with it in the ordinary trade channels. As it is not in any sense a specialized tool for manufacturing munitions; the war demand was an unexpected development in the plans for marketing it.

Fig. 1 shows the 18-in. lathe, the complete line including 20, 24 and 28 in. sizes as well. The lathe shown has semi-quick change gears, but the bed has been designed to permit a quick change arrangement as well. The three-step cone pulley and double back gears are designed in keeping with the unusually powerful proportions employed throughout the lathe. Large and small face plates and steady and compound rests are furnished regularly and special compound turret tool blocks, front and rear connected rests and taper attachment may be obtained at an extra charge.

The sturdy character of the lathe is indicated in part by the materials of construction. No cold-rolled steel is used in any particular. The rack instead of being steel of 0.15 to 0.20 carbon is of 0.40 to 0.50 carbon, the spindle is forged from a 6-in. billet of 0.45 to 0.55 carbon steel with manganese 0.50 to 0.60 and phosphorus 0.03. The spindle after being forged is annealed and heat-treated, i.e., reheated to a temperature of 1525 deg. Fahr., and quenched in water, after which it is re-

annealed at 1225 to 1250 deg. The metal for the spindle bearings is an alloy containing 86 per cent tin, 7 per cent antimony and 7 per cent copper, a composition easily recognizable for its wearing qualities.

The foundation of the interchangeability of the parts of this lathe is established in the bed, as are the accuracy and stiffness of the tool. The bed casting is heavy, weighing 1245 lb. for the 18-in. tool having a 7-ft. bed, and is designed with substantial ways affording a broad bearing. It is mounted on the legs with a three-point bearing, the bottom of the bed and the tops of the leg castings being spot faced at the time they are drilled for the holding down bolts. The width of the leg casting is slightly less than that of the bed so that the clearance between legs and bed, due to the bearing bosses, is not apparent as indicated in the accompanying view of the lathe. Between the V's the bed is entirely open, so that the undercut which gives the machined surface for clamping the carriage may be made at the same setting as the ways, and with the same accuracy. For a minimum depth of $\frac{5}{8}$ in. below the bottom of the V's the metal of the bed is densified, the metal being given a close structure, harder than any of the surfaces that bear on the bed, yet capable of being machined readily to a highly finished wearing surface.

For the machining of the ways, six 7-ft. beds are mounted on a 48 x 48-in. x 30-ft. Cincinnati planing machine as shown in Fig. 2, the V's being finished to gage. All of the angles on bearing surfaces of all parts of the lathe are either 30 or 45 deg., and in setting the cutting tools for machining these surfaces dependence is not had upon the swivel graduations of the tool heads, but the tools are set to the feeler gage shown. This same gage is used for all of the jobs on whatever machine an angle surface is being finished, so that there is an absolute uniformity obtained. The machining of the ways is done in two roughing and one finishing cut. Between each cut the set-up is released and the job repacked so that all strains may be relieved. The tool set-up provides for planing the two parallel faces of the double V simultaneously from the one head with a special double-point tool, and for taking as many as six cuts on the flat faces at the one time. The bed castings are sand blasted and pickled to insure an acceptable finish when painted.

The method of machining the headstock, carriage and tailstock slide is dependent upon the special planing machine platens on which the machining is done. As shown in the several illustrations, the tables have slots running in accurate parallelism

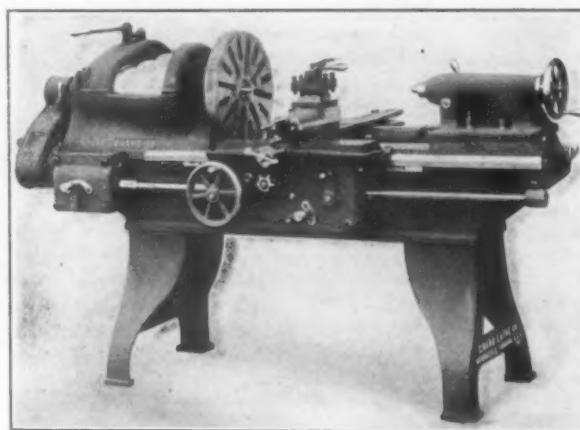


Fig. 1—The Chard 18-In. Lathe with Semi-quick Change Gears, Compound Rest and Turret Tool Post.

with the travel of the machine and also at exact right angles. The alignment of the part being machined with these slots is an essential feature contributing to the nicety of alignment of these parts when mounted on the bed.

Fig. 3 shows the headstock mounted on a 30 x 30-in. x 14-ft. Gray planing machine with the necessary gage and distance blocks which are keyed into the platen slots, fixing easily and accurately the position of the work. The headstocks are then machined in multiple. The bearing boxes are rough bored for the bearings on a horizontal boring machine, the bearings being die castings made of an alloy, the analysis of which has already been given, and requiring only a touching up with the scraper to effect an all-around fit. This feature of incorporating the bearing metal in the form of a die casting also contributes to interchangeability in the lathe. The long bearing is positively held in place by four and the short bearing by two cap screws. To finish the bearings with the accuracy desired after machining to within 0.01 in. on the horizontal boring mill the device shown in Fig. 5 is employed. It is used for both head and tail stock bearings and its purpose and effectiveness are apparent from the illustration. The caps are bolted down on the bearings with liners as under operating conditions and the special boring bar introduced. This bar is fitted with single-point tools which are pulled through the bearings, the long screw and nut shown at the left feeding the tool along the bearing as the bar is turned by hand. This method of finishing the bearings together with the accurate grinding of the spindles after two roughing cuts have brought them within 0.007 in. of size, results in the limiting of variance to 0.001 in. in a length of 24 in. and makes the spindles actually interchangeable without additional fitting, in any number of headstocks.

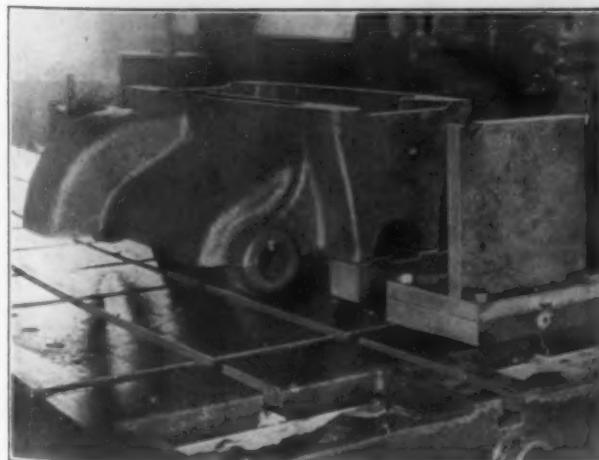
The method by which a correct alignment is secured in the machining of the carriage, on the bottom for the bed V's and on top for the compound rest slide, is illustrated in Figs. 4 and 8. Both



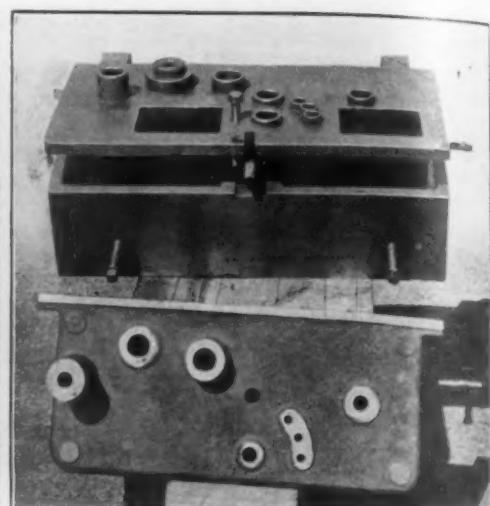
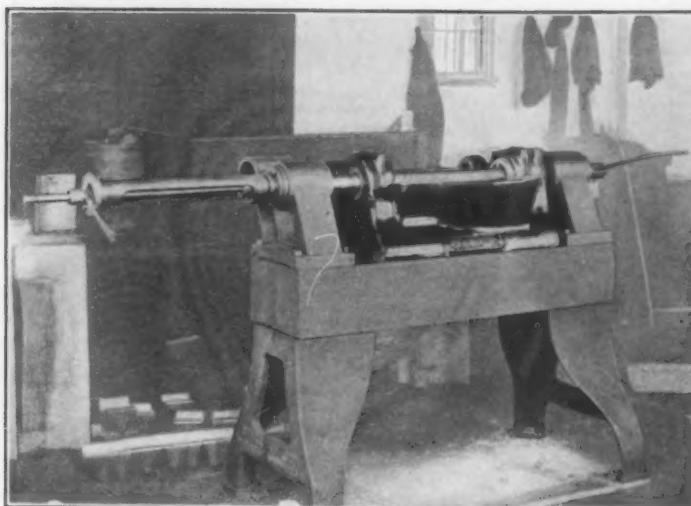
Fig. 2—The Lathe Beds Mounted on the Planing Machine for Machining the Ways and Showing the Angle Gage with Which the Tools Are Set for the V's and the Distance Gage to Which the Ways Are Machined

jobs are done with a multiple setting on the same planing machines as are used for the headstocks. As shown in Fig. 4 the carriages are locked in between end gage blocks at exact right angles with the travel of the machine so that when the bottom grooves are machined and the carriage is turned over as in Fig. 4, being located by setting the grooves on inverted V-blocks which key into the slots of the machine platen, it is assured that the machining of the dovetail will be at just 90 deg. with the spindle. In fitting the slide to the carriage, all slides are fitted to a master plate and vice versa, thus establishing a positive interchangeability. The dovetail in the carriage is inverted in the interest of greater strength.

The set-up for the machining of the carriage slides and taper gibbs is illustrated in Fig. 7. The taper side of the slide is first machined with the slide locked on the planing machine against a taper block, the taper gib, meanwhile, being milled off on a Kearney & Trecker milling machine. The taper block is then replaced with a straight piece and the taper gib set in for the finishing of the work. The apron is machined in an exceedingly simple yet accurate



Figs. 3 and 4—At the Left Fig. 3 Indicates the Manner in Which the Headstock Is Mounted on the Planing Machine and Placed in Alignment with the Right-angle Slots of the Platen To Insure Correct Machining of the Bottom Grooves, while Fig. 4, at the Right, Shows how the Carriage Is Mounted on the Planing Machine Table Exactly at Right Angles to the Position Shown in Fig. 8 To Be Machined on Top and for the Compound Rest Slide



Figs. 5 and 6—At the Left Is Shown the Special Device Used for the Accurate Finishing of the Spindle Bearings with a Single-Point Tool, Which Is Fed Through the Bearing by a Hand-Operated Pulling Screw, and at the Right Is a View of the Apron and the Special Fixture for Machining It on a Radial Drilling Machine

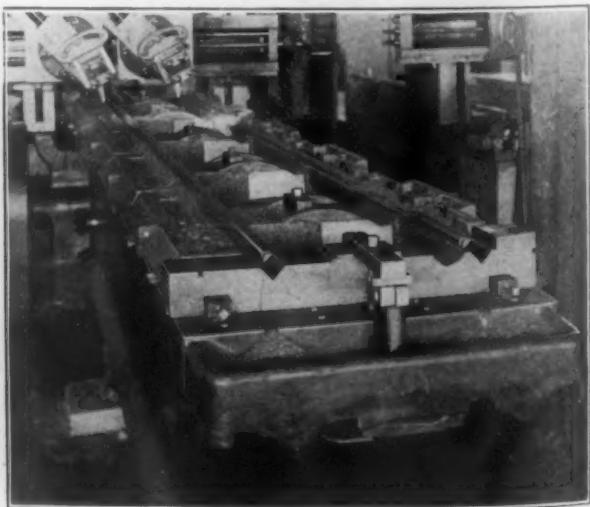
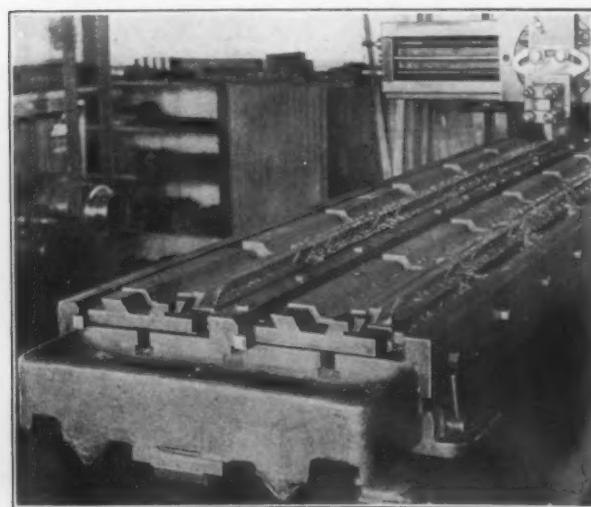
manner. The bosses are first milled off with an end mill on a No. 3B Kearney & Trecker milling machine. The apron is then set in a fixture, shown in Fig. 6, and drilled on a radial drilling machine, but three changes of drills being required.

In the method of manufacturing this lathe there is constantly in evidence a natural choosing of the logical way to do things. In the design and the building of the lathe there is an elimination of what has not had an actual demonstration of value in practice. This is especially true in the matter of little things. For example, the headstock spindle bearings do not overhang but the metal runs up flush to the ends of the bearing; the hand grips on the apron handwheel and the cross feed turn on studs rather than in the hand of the operator; the faces of cone pulleys are finished on the grinding machine; the lead screw may be drawn out of the feed box and changed by simply driving out the pin which passes through the collar and screw, immediately at the right of the feed box, as shown in Fig. 1; the lathes are shipped with every part numbered in accordance with an accompanying card list which shows the name and association of each part and the crating for shipping the lathes is all standardized and made up in quantity so that it needs only to be assembled when desired. These and other features smack of the long experience in lathe building which has been brought to this project by the designer of the lathe and president

of the Chard Lathe Company, N. D. Chard. The standard specifications for the Chard lathe are as follows:

Swing over V's, in.	18 $\frac{1}{2}$
Swing over carriage, in.	10 $\frac{1}{2}$
Distance between centers, in.	32
Tailstock spindle travel, in.	8
Tailstock spindle diameter, in.	2 $\frac{1}{4}$
Morse taper of centers.	No. 4
Diameter of hollow spindle, in.	1 $\frac{9}{16}$
Diameter threaded spindle nose, in.	2 $\frac{5}{8}$
Number of cone pulley steps.	3
Diameter of largest cone pulley step, in.	12
Diameter of smallest cone pulley step, in.	8
Width of belt, in.	3 $\frac{1}{2}$
Back-gear ratio, first.	3.25:1
Back-gear ratio, second.	10:1
Feed range, in.	0.009 to 0.133
Number of spindle speeds.	18
Size of tool, in.	5 $\frac{1}{8}$ x 1 $\frac{1}{4}$
Capacity steady rest, in.	6 $\frac{1}{2}$
Capacity, follow rest, in.	3
Travel of compound rest, in.	4 $\frac{3}{4}$
Lead screw, threads per inch.	4
Net weight, lb.	2,864

With elaborate exercises, including a large parade held on June 17, the centenary of gas lighting was celebrated in Baltimore, Md. The Consolidated Gas, Electric Light & Power Company conducted the ceremonies, which attracted widespread attention. Gas was first used in America in Baltimore on June 13, 1816.

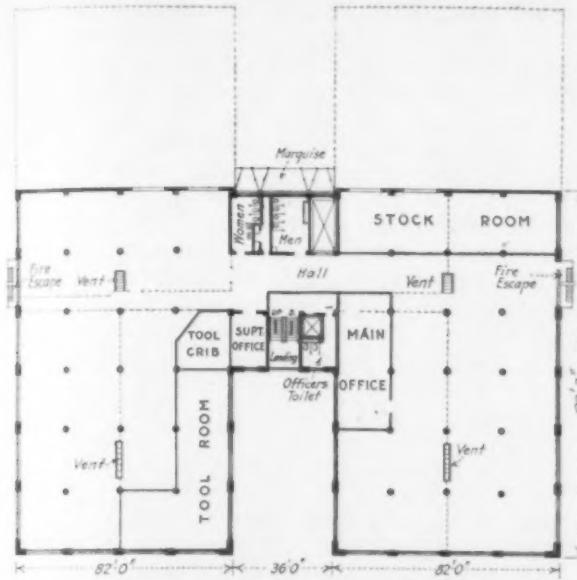


Figs. 7 and 8—At the Left Twelve Carriage Slides and Taper Gibs Are Being Finished at One Setting of the Planing Machine and at the Right the Carriage Is Shown Mounted in Multiple on a Planing Machine for the Cutting of the V-Grooves

NEW CUTTING DIE PLANT

Uniform Size Shafts and Other Features of Webster & Perks Factory, Springfield, Ohio

The new plant of the Webster & Perks Tool Company, maker of cutting dies, occupies the fourth floor and a portion of the third floor of the new six-story reinforced-concrete Shuey Factories Building, Springfield, Ohio. The structure, which was especially designed for manufacturing purposes, is U-shaped, the wings measuring 82 x 130 ft. On account of the shape of the building there are windows on all four sides, extending from the



Plan of the Fourth Floor of the Springfield Factories Building Showing the Partitions Installed by the Webster & Perks Tool Company and the Provision Made for Future Expansion of the Building

ceiling to within 3 ft. of the floor, thus giving light in abundance even on the darkest days. A passenger elevator is located on the west side, adjacent to the main entrance in the center of the court, while on the opposite side is an Otis elevator with a platform measuring 8 x 20 ft., which is used for freight and by the workmen during the rush hours.

One wing, the north one, is used by the company as its main manufacturing department, while the other wing is utilized as a machine shop and for storage purposes. The corridor connecting the two wings is wide enough in front of the freight elevator for the storage of castings, thus enabling them to be delivered to either department of the plant with a minimum trucking haul. The wire inclosed toolroom, 20 x 80 ft., is located in a corner of the manufacturing department and contains a number of small machines. The tool crib for storing the tools used in the shop adjoins the toolroom. The pattern shop is located in one corner of the south wing. The stockroom, which is situated at the left of the freight elevator, is also inclosed with wire and all material such as round and flat bars, bolts, nuts, etc., is kept there. Two cutting-off saws are provided so that when the stockkeeper receives a requisition from the shop for a piece of shafting, for example, he can cut it to the exact length required. The main office, at the right of the passenger elevator, has an opaque glass partition on the shop side and a door opening into the shop in the south wing. On the opposite side, in the north wing, is the superintendent's office, which is large enough to accommodate a large

drawing table and a photostat outfit, in addition to the regular office equipment.

The experience of the company has demonstrated that it is more satisfactory to heat treat all of its machine parts, as there is no delay and the cost has been reduced considerably as compared with the prices paid when work was sent out. Two Stewart combination furnaces and two Franklin furnaces have been installed to handle this work. The north shop finishes a large number of small parts and these are stored in boxes or stacked on raised platforms and transported by lift-trucks to any part of the plant. Formerly these were stored on the floor, thus making double handling necessary, as well as requiring extra floor space, but at the present time three lift-trucks handle all of the work satisfactorily.

Uniform size shafting, 2 7/16 in. in diameter, is used throughout the plant and a uniform speed of 200 r.p.m. is maintained, even though the group drive employing individual motors is used. It is thus generally unnecessary to change pulleys when moving a machine from one part of the shop to another. If, however, a pulley should have to be moved, it will fit any main line or countershaft, in the plant.

The heating plant for the whole factory building is located in the basement, fresh air being drawn in from the outside and forced over cast-iron blast heaters and through separate ducts to each floor in the building. The vitiated air is drawn out through another set of ducts and the system is designed to change the air four times every hour without opening windows with resultant undesirable cold drafts. The desired temperature is obtained by turning on the warm air 15 min. before work commences in the morning.

A not uncommon system is employed for keeping track of the tools borrowed by workmen. The clerk in charge of the toolroom provides each man with five numbered metal checks. When a tool is wanted the workman goes to the window and receives the desired tool in exchange for one of his checks. This check is filed on a rack showing the kind of tool delivered and represents a charge against that particular workman. All small tools must be returned to the tool crib on Saturday of each week, and before leaving the employ of the company, the workman is required to turn in all five checks and secure a receipt from the toolroom clerk before he can receive the amount of wages due him.

Large Order for Compression Shaft Couplings

The Remington Arms & Ammunition Company has placed an order with W. H. Nicholson & Co., Wilkes-Barre, Pa., for 1017 compression couplings for shafting 2 7/16 in. in diameter. These couplings, which are to be used at the new ordnance plant that has been built at Ilion, N. Y., comprise four jaws and two flanges. One edge of the jaw is flat while the other tapers from both ends toward the center. They are placed on the shaft at intervals of 90 deg. and the two heavy cast-iron flanges, which are machined to fit the tapered side of the jaws, slide over the ends and are fastened together by four bolts. The pulling up of the nuts, of course, exerts pressure on the jaws and causes them to grip the shaft.

The Societe Altos de Malaga at Malaga, Spain, restarted its plant in April, according to *L'Usine* of France, and has applied to the Spanish Government for permission to export, free of duty, 25,000 tons of steel ingots per year, a similar concession having been granted to the Societe Altos Hornos de Vizcaya of Bilbao, Spain. The Malaga company has one 30-ton open-hearth furnace.

Wear of Cast-Iron Cylinders and Liners*

Important Influence of the Surface Structure and Crystalline Arrangement—Hardening Due to Rubbing—Practical Examples

In the modern high-speed steam and internal-combustion engines, cast iron up to the present is the only metal which has given satisfactory working results when used for the construction of certain vital parts, such as pistons, piston rings and cylinders. This fact, coupled with the serious drawbacks of cast iron in other ways, is sufficient to prove the tremendous importance of a careful study of this subject.

The two chief properties required of cast iron for the purpose named are maximum resistance to wear and the most perfect running properties under the conditions existing in the engine. The mechanical properties, such as the tensile and transverse strength, can usually, without much difficulty, be obtained sufficiently high to withstand the stresses involved in the use of the generally accepted thicknesses of material. The modern tendency, however, seems to be to cut down the weight of members

itself. This is of necessity an exceedingly slow method of investigation, and hence the lack of any definite and reliable knowledge of this most important subject.

The wear of any given sample of metal is understood to be the loss in weight sustained by that sample under the action of a particular force or set of forces. In the particular case of engine cylinders it is the loss in weight sustained by the cylinder under the action of the piston. The running property of an engine cylinder is a peculiar property whereby the cylinder is enabled to give the most satisfactory results in actual working from the point of view of absence of trouble from overheating and galling or seizing. Essentially these two properties are different, but at the same time there is a distinct relationship between many of the controlling factors in the two cases. In the ideal engine the piston rings alone are in actual contact, scraping the surface of the liner. When in action the piston does not exert a constant and equally distributed pressure over the whole surface of the cylinder, but by the reaction of the connecting-rod at certain positions the surface of the liner is subject to alternately varying loads which act at portions of the liner surface in the vertical plane.

The wear of the cylinder is generally supposed to vary with the hardness—that is, under a constant load—and it is the usual practice to allow the piston to be constructed of a slightly softer material than the cylinder, for the reason that the piston is usually more easily replaceable after wearing than the liner. Nevertheless, the engineer is often confronted with cylinders rejected for excessive wear, in which the whole set of hardness numerals on the cylinder, piston, and piston rings are quite in order, or at least identical with other sets which are running perfectly well; and in records of liner failures it is very often an impossibility to correlate the hardness figures and the wear.

In composite metals, such as cast iron, in addition to the hardness numeral, the surface structure and arrangement exert an important influence on the wear. The surface structure of the normal cylinder of cast iron consists of a matrix of ferrite, pearlite, phosphide eutectic, and cementite grains, intersected by graphite plates. Phosphide eutectic and cementite are extremely hard and brittle, while ferrite and pearlite are soft and tenacious. The surface is therefore composed of soft, ductile, and tenacious grains, together with hard and brittle grains, broken up by numerous graphite plates. Under the continuous rubbing action, these grains, which are very weakly cemented together by the graphite plates, become loosened, and eventually detached. An examination of worn liner surfaces shows the result of this action very clearly. The surface is seen to be covered with numerous comparatively large pits, on visual inspection, Fig. 1, while under the lens the granular structure will be seen quite plainly, which fact is the result of the slight loosening of the grains under the alternating action of the piston. This appearance should particularly be noted, as it is often erroneously described as being due to the dislocation of the graphite plates only.

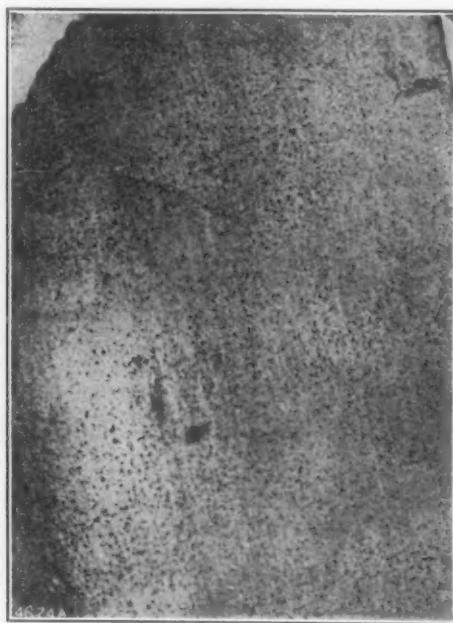


Fig. 1—Appearance of the Surface of a Worn Cast-Iron Liner, Slightly Reduced

to a minimum, and for this reason higher tensile strength irons will be more and more in demand.

The two requirements already mentioned—good running properties and resistance to wear—are very often confused by engineers. For instance, certain kinds of cast iron are not considered ideal for cylinder work, for the reason that they do not wear well, when what is understood is that cylinders of this class of metal will not develop good working surfaces in use. In many ways, however, the two properties are intimately connected, although it is better for the purposes of study to consider them separately. Owing to the lack of any satisfactory means of determining the resistance of any given sample of cast iron to wear, and also its "running" properties, the only means of studying the question open to the investigator is to examine actual cases of wearing and running in the engine

*From London *Engineering*. The article is based on an investigation at a large English works.

This dislocation of the grains is in all probability brought about mainly by the direct abrasive action of the piston rings, assisted by a sort of fatigue brought about by the vibratory motion of the piston, which assists in the loosening of the grains. The detached material eventually becomes powdered, and remains suspended in the film of oil, and is eventually pushed out along with the oil. At the same time as this dislocating action is taking place another action, somewhat different in character, is also going on. This action is practically identical with that of polishing microsections in bas-relief, and is in all probability due to the action of the piston proper, together with the polishing action of the suspended powder resulting from the first-named action. The effect of this is to be seen on examining worn surfaces under the microscope, when the harder phosphide eutectic and cementite grains will be seen, without previous etching, standing in relief. These hard points, under the influence of the former dislocating action, in a like manner become detached, and with the constant repetition of this action the total wear is increased.

of hard points in a soft matrix, and in the other case a surface is obtained composed of holes which can be considered soft areas, and the remaining matrix can be considered the harder areas.

Under the influence of continued alternating rubbing action, the surface of cast iron undergoes a transformation which results in increasing the surface hardness. Under this action certain of the crystalline surface components become transformed from the crystalline into a vitreous state. The amount and character of this action depends on the chemical character of the grains composing the surface, although it takes place to a more or less extent in all cast-iron surfaces subjected to similar conditions, and accounts for that peculiar phenomenon known to engineers as "glazing." In cast-iron surfaces which have undergone this peculiar change a marked increase in hardness is noted, in many cases to such an extent as to defy attempts at filing the surface. The influence of this action on the wear of cast iron will obviously be twofold; first, the peculiar hardness and physical characteristics of vitreous phases resist attempts at wearing

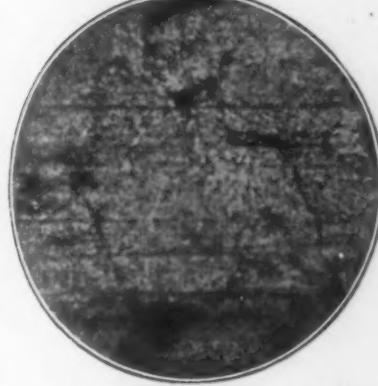


Fig. 2—Appearance of the Surface of Worn Liner, Unetched, Magnified 200 Diameters



Fig. 3—Cast-Iron Surface Showing Severe Machining, Magnified 120 Diameters

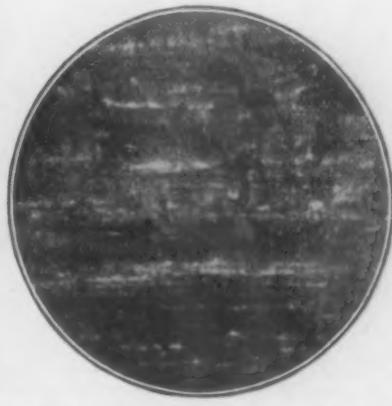


Fig. 4—Cast-Iron Surface Showing Gentle Machining, Oblique Illumination, Magnified 120 Diameters

PHOTOMICROGRAPHS OF WORN SURFACES OF CAST IRON

The extent to which these two actions are respectively responsible for the total wear which has taken place depends largely on the surface character of the iron used. This may vary from, on the one hand, a large-grained, coarsely-graphitic excess ferrite, to on the other hand, a close-grained, fine-graphite excess pearlite, depending largely on the chemical composition and rate of cooling of the particular cast iron. In the extreme former case the particles are so weakly bound together that a small force only is necessary to dislocate them, whereas in the latter case the intercrystalline cohesion is much stronger, so that the particles are better able to resist the disintegrating action, with the result that in such a type of metal this, the most rapid cause of wear, is at a minimum, and the wear is most largely brought about by the fracture of the phosphide eutectic points. The casting temperature, "growth" and corrosion, and, in fact, all factors which tend to loosen the granular structure of cast iron, will indirectly influence the wear, and hence the importance of complete scientific control of these types of castings.

Incidentally in the light of the orthodox rule for the production of ideal "running" parts—hard points embedded in a soft matrix—it will be seen that the result of the two types of wearing action practically ensures a perfect "running" metal. For in the one case a surface is obtained which consists

by mechanical disintegration; and second, in many cases a fine layer of this matter flowed over the normal surface structure prevents to a large extent the disintegration.

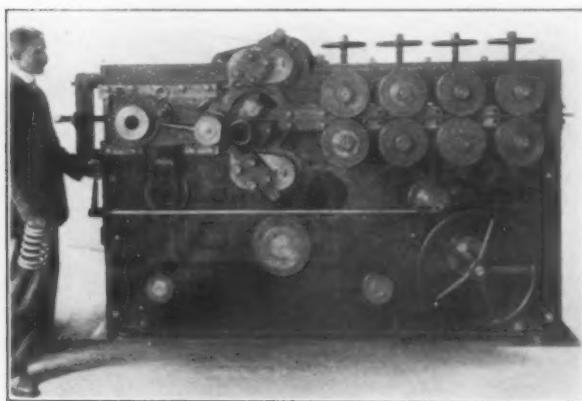
The great practical difficulty in investigating this particular action is that it is necessary to study the cylinder in actual working, for in many cases of returned cylinders the length of time they have been exposed to atmospheric influences after dismantling is sufficient to allow of these "vitreous" surfaces altering in character. The general appearance of worn liner surfaces examined some time after dismantling is illustrated in Fig. 2, which is a photomicrograph of a sample of a large gas-engine liner which had been in daily use for some years, and was not examined until two weeks or so after dismantling. The peculiar confused granular appearance is to be noted as evidence of the glazing action.

Another important point in this connection is the character of the treatment undergone by the cast-iron cylinder during machining. It will be evident that a cast-iron surface will suffer from disintegration under the action of the machine tool in a somewhat similar manner, though larger in degree, as the surface does in the engine. The more deep and severe the cutting action, the larger the disintegration and distortion. It is probably extremely fortunate that the extreme accuracy nec-

essary in such details as cylinders and liners has necessitated very careful machining, and therefore such parts have not to such a large extent been the victims of the modern advances in the art of machining. Photomicrographs showing the effect of rough machining and gentle machining are given in Figs. 3 and 4. The distortion and disintegration will be evident in both instances, but to a much larger degree in the roughly-machined specimen. Complete freedom from such surface cracks and disintegration is obviously an impossibility whatever the method of machining may be, and the comparatively recent method of internal grinding of liners and cylinders is, for this reason, more satisfactory.

Large Cold Spring Coiling Machine

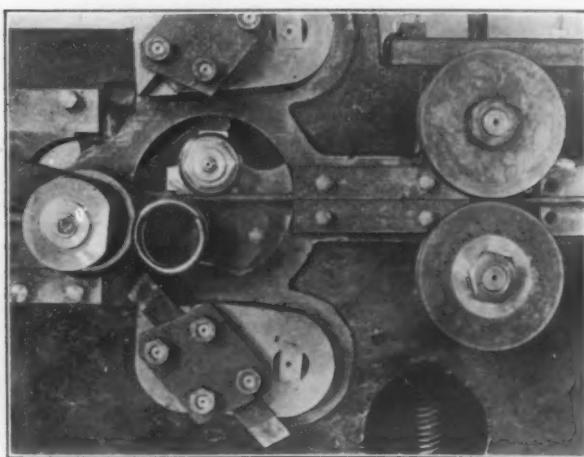
What is believed to be the largest cold spring coiling machine ever built has been recently completed by Sleeper & Hartley, Worcester, Mass. This machine marks the end of a series that will handle



In this Cold Spring Coiling Machine, Which Is Probably the Largest Ever Built, the Wire Is Fed Forward Against a Coiling Point To Form the Spring Instead of being Wound around an Arbor

wire from 0.004 to 0.015 in. in diameter in the smallest size, while this last machine takes oil-tempered stock $\frac{5}{8}$ in. square. The special feature is that the spring is not produced by being coiled around an arbor, the stock being fed forward by feed rolls against a coiling point or deflector. The machine is automatic, coiling and cutting alternately. A predetermined amount of wire is put into each spring, and when the completed one is being cut off the coiling mechanism is stopped.

Either extension or compression springs can be made on the new machine, and adjustments are provided to regulate the feed or the amount of wire



A Nearer View of the Coiling Mechanism

which can be fed into a spring. Other adjustments for changing the diameter, pitch and contour of the spring are also provided. A train of gears provides the feed changes, and it is pointed out that these can be regulated very closely through an adjustable cam controlling an automatic clutch. Cam control is also provided for the diameter and contour forming mechanism, one cam only being required to produce a taper spring, while a single pair of cams will produce all varieties of barrel-shaped springs. The control of the pitch is automatic, and the springs may be produced with an open spiral or with the coils laid close, an arrangement which enables springs with squared ends to be produced, thus eliminating the necessity for heating and pressing the ends of the springs to square them. The time required to change the machine over from one spring form to another is between 30 and 45 min.

An arbor is used in the machine to provide a cutting edge against which an exterior cutter can carry the wire to shear it off after the coiling of the spring is completed.

New Swedish and Norwegian Iron Works

Iron and steel production in Sweden and Norway, with special reference to the utilization of domestic resources, is receiving special attention, according to the *London Times*. In Sweden large iron works are now approaching completion at Oxelösund, with the output estimated at 60,000 tons of pig iron annually and about 100,000 tons of coke, in addition to by-products.

In Norway an interesting plan for large iron works has been prepared by a committee of the technical societies, with a minimum output of 50,000 tons per year. It is urged that the plant be located near convenient water power and within 300 km. of Narvia, the Norwegian export harbor for Lapland iron ore. A coke plant is contemplated using foreign coal, the manufacture of by-products from the coke plant, a complete steel works, a steel foundry and rolling mill. About 125,000 tons of English coal is figured as necessary as well as a capital of about \$4,000,000. It is advised that plans should be made for an increase in output to 150,000 tons per year, which would supply the present imports of 100,000 tons and leave a margin of 50,000 for export.

Iron consumption in Norway is increasing, while the production has dwindled decidedly with the export of iron ore growing at the same rate that imports of pig iron are increasing. The projected plant is expected to be of great advantage to the Norwegian shipbuilding industries, which are being greatly extended, with new ones being built.

Electric Steel in Australia

The installation of electric furnaces in each of the six capitals of Australia for making cast steel out of scrap is reported. The enterprise is backed by a company with the first plant to be erected in Sydney, the next in Melbourne and the third in Perth. The furnace is said to be a Swedish type with an English metallurgist to superintend the plants. The possibilities of such a process are considered excellent, since that country imports 8000 to 10,000 tons of steel per year.

The first Western presentation of the four-reel film performance depicting the works of the L. S. Starrett Company, Athol, Mass., mechanics' tools and instruments of precision, was given before a select gathering of more than 100 Milwaukee tool salesmen and employees in Merchants and Manufacturers' Association assembly hall. The performance was in charge of Kenneth J. Grant, Northwestern traveling representative of the Starrett Company.

The Japan-Chinese Industry Company is reported to have obtained a concession for the exploitation of the extensive iron-ore mines in the district of Yantzi, China.

FOR EXPORT EXPANSION

Plans to Give Engineering Advice to Buyer and Service to Seller

Some notable additions have been made to the staff of the American Steel Export Company, indicating a rapid expansion, particularly for a company only one year old. The latest to join the company are Kurt A. Orbanowski, who has been identified chiefly with the Russian business negotiations of Gaston, Williams & Wigmore, Inc., and who becomes treasurer of the company, and Samuel A. Benner, best known as former general manager of sales of the Carnegie Steel Company. The association with the organization of G. A. Harris, formerly of Takata & Co., and of F. A. Kelly, formerly of the United States Steel Export Company, has already been noted briefly in these columns. The caliber and experience of the new men, as noted below, supply some measure of the service which the company aims to give to the buyer as well as maker.

It was on June 15, 1915, that the American Steel Export Company was organized by officials of the Cambria Steel Company, with that company controlling 58 per cent of the stock. Its object was to secure for the Cambria Steel Company a large share of the export

of the Vaterland. From November, 1914, until recently, he was manager of the steel and machinery department for Gaston, Williams & Wigmore, Inc., New York City. He is now treasurer and a director of the American Steel Export Company and will have general oversight of all matters of a technical nature, and especially of business with Russia.

Samuel A. Benner was born in Pittsburgh in 1871, and in 1888 went into the general office of Carnegie, Phipps & Co., Ltd. On the consolidation of this firm and of Carnegie Bros. & Co., Ltd., into the Carnegie Steel Company, Ltd., in 1892, he became chief clerk in the general sales department under the general sales agent, William P. Palmer, now president of the American Steel & Wire Company. In 1897, 1898 and 1899 Mr. Benner represented the Carnegie Steel Company, Ltd., in Montreal and in Mexico, and investigated conditions in Europe and South America, becoming foreign sales manager for the company in Pittsburgh in 1900. In the latter part of 1902 and until the latter part of 1904 he was head of the sales department for the International Nickel Company, but he returned to Pittsburgh in 1904 to become general manager of sales of the Carnegie Steel Company. In 1911 he became assistant to the president of the Pittsburgh Steel Company and continued in that capacity for two years. Since then he has devoted himself to special work for particular interests, both here and in Europe,



K. A. ORBANOWSKI



G. A. HARRIS



S. A. BENNER



F. A. KELLY

ADDITIONS TO STAFF OF THE AMERICAN STEEL EXPORT COMPANY

offerings which were beginning to materialize definitely, but almost immediately the business developed so rapidly that the output of other mills had to be sought for the foreign buyers, and at this writing the American Steel Export Company has sold for about thirty-five mills of the country in different lines and has established offices in foreign cities. In March of this year the Cambria Steel Company sold the controlling interest to H. W. McAtee, formerly assistant to the president and controller of the Cambria Steel Company, and to C. B. McElhany, formerly vice-president and general manager of sales. These gentlemen became president and vice-president respectively of the American Steel Export Company, and Otto Kafka, who started the export business as general manager of sales, is now secretary.

Kurt A. Orbanowski was born in Russia 40 years ago. He was graduated from Charlottenburg as a naval architect and became general manager of the Putiloff Ship Yards, at Petrograd, a subsidiary of the Putiloff Steel Works, which in addition to building ships also operated car, locomotive and bridge shops and a large artillery factory. Being a graduate naval architect, and having personally designed and built large ships, he is a member of the Institution of Naval Architects of Great Britain, and of the Society of Naval Architects and Marine Engineers of the United States. He was decorated by the Czar for a prize design of Russian battleships. Before his affiliation with the Putiloff Ship Yards he was connected with Blohm & Voss, Hamburg, the builders among other notable ships

and he takes up his new work with an extensive acquaintance in and knowledge of the requirements of foreign markets, together with a knowledge of the iron and steel business in the United States.

G. A. Harris was born 39 years ago and was graduated in 1898 from the Stevens Institute of Technology. He served in the American merchant marine, and during the Spanish-American war was chief electrician of the U.S.S. Vixen. After the war he served in the Brooklyn Navy Yard on electric installations in torpedo boats and then went with the Westinghouse Electric & Mfg. Company, at East Pittsburgh, becoming constructing and erecting engineer. In 1900 he entered the employ of Takata & Co., the noted Japanese engineering and contracting firm, as an engineer in the New York office, and in 1902 was appointed chief engineer. He now has charge of the engineering and machinery department of the American Steel Export Company, and in this position will fill the gap between the foreign buyer or consumer who wishes to buy certain equipment or machinery, or to make something and does not know where and how to get the necessary equipment; and the American manufacturer who desires to enter into the export business and is not familiar with the methods required to do so successfully.

Frank A. Kelly is a native of New York City, graduate of the College of the City of New York, and has spent his commercial life in the export trade. In 1898 he identified himself with the Carnegie Steel Company, Pittsburgh, as export freight agent. In 1912 he moved to New York City to become associated as

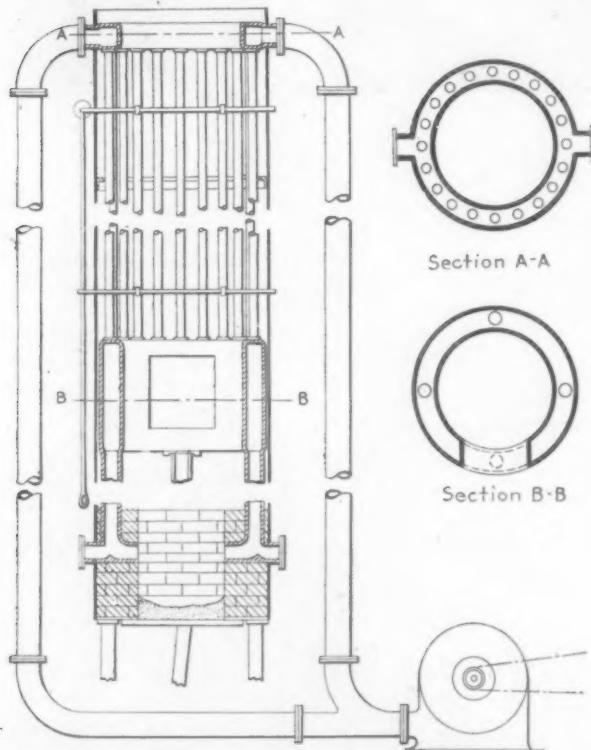
freight agent with the United States Steel Products Company, the export unit of the Steel Corporation, leaving that service to become traffic manager for the American Steel Export Company.

A Cupola Which Preheats the Blast

A new type of cupola, in which the blast is preheated before coming in contact with the fuel, was described by J. A. Parsons in the *Journal of the South African Institute of Engineers* for March, 1916. The air passes through a series of tubes in the chimney of the cupola, after which it is blown through the tuyeres to the fuel. When the blast is first started, the air reaches the fuel bed only slightly warm. Within a few minutes it reaches the temperature of melting lead, and at the end of about 20 min. it attains a temperature about one-third of that to be imparted to the iron.

Economy in the use of coke is obtained by means of the preheater, due to the fact that only about one-half of the coke is burned to CO_2 in the neighborhood of the tuyeres, the other half being burned to CO which later burns to CO_2 in the chimney. The burning of the coke to CO generates only 4320 B.t.u., and the burning of CO to CO_2 generates an additional 10,220 B.t.u. Inasmuch as this additional heat is generated after the CO has passed the iron in the cupola, its heating effect is lost. The preheater located in the chimney recovers a large portion of this heat and returns it to the cupola in the blast. The economy in coke claimed for the preheater, as the result of 7 months' operation, is 30 to 39 per cent, according to the duration of the cast.

It is also claimed that the quality of the metal is improved, and that the tuyeres do not clog up. The furnace can be temporarily held up, by diminishing the blast, yet the remainder of the blast comes in so hot that the melting can be reduced in proportion and without cooling the furnace unduly. This latter feature permits of great flexibility of operation. Furthermore, the capacity of the cupola is much increased. A 24-in. cupola can handle up to 2 tons of iron per hour with a 6-oz. blast. The size called for by text books for this



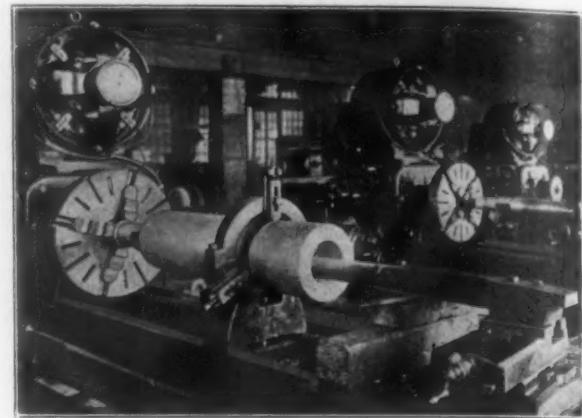
The Air Is Passed Through Tubes in the Cupola Chimney Before Reaching the Tuyeres

capacity is 34 in., with a 7-oz. or 8-oz. blast. This results in a low first cost and small repair charges. The preheater described has been in use for over seven months, and no deterioration in the tubes of the preheater is apparent.

Boring of Large Sockets for Oil Wells

A number of 30-in. lathes built by the American Tool Works Company, Cincinnati, Ohio, are in use at a large oil well tool shop for boring the holes in oil well sockets. In this shop a number of 27-in. tools of the same make are employed for turning the drills for oil wells. The lathes are equipped with S.K.F. ball bearings on the spindles to take care of the thrust.

In boring the sockets the work is clamped between jaws in the face plate of the lathe, while the boring tool is held in the tailstock and fed into the work. The hole



Boring a Hole $7\frac{1}{2}$ In. in Diameter and $42\frac{1}{2}$ In. Deep in an Oil Well Socket in a Lathe by Feeding the Boring Bar into the Work by the Tailstock

being cut measures $7\frac{1}{2}$ in. in diameter and $42\frac{1}{2}$ in. deep. The steel machined is of 0.60 per cent carbon and the cutting speed is 127 ft. per minute and the feed approximately $1/16$ in. For the finished boring of the socket the same rate of feed is used but the cutting speed is increased to 140 ft. and the boring bar is held in the compound rest. The oil well drill turned on the smaller lathe has a carbon content of 0.80 per cent. A cut $\frac{1}{2}$ in. deep is taken with a $1/16$ -in. feed, the cutting speed being 80 ft.

Magnets Effect Savings in Loading Pig Iron

An estimated saving of \$400 to \$500 at each loading is said to result from the use of lifting magnets for handling pig iron from the dock to the vessel hold. According to data supplied by the Cutler-Hammer Clutch Company, Milwaukee, Wis., the cost of loading 2000 tons of pig iron on the freighter *Cicoa* of the Charcoal Iron Company of America, which was referred to in THE IRON AGE of June 1, was only \$100. The cost of loading with longshoremen would have amounted to between \$500 and \$600. The pig iron is dropped as soon as the current is cut off from the magnet (which is handled by a ship's derrick) and the vessel's crew stores the iron in the hold.

Duplex Exciter Sets for Generators

The Terry Steam Turbine Company, Hartford, Conn., has built a duplex exciter set consisting of an exciter generator coupled to a motor at one end and to a steam turbine at the other. In the event of an interruption to the supply of current to the motor, the governor of the turbine takes hold.

Three Japanese representatives of the Kuhara Mining & Smelting Company of Japan—Messrs. Niewa, Suzuki and Tokunaga—are reported as having arrived in Australia to study local mining methods and to make contracts with metal producing companies and others for exports of metals and ores to Japan.

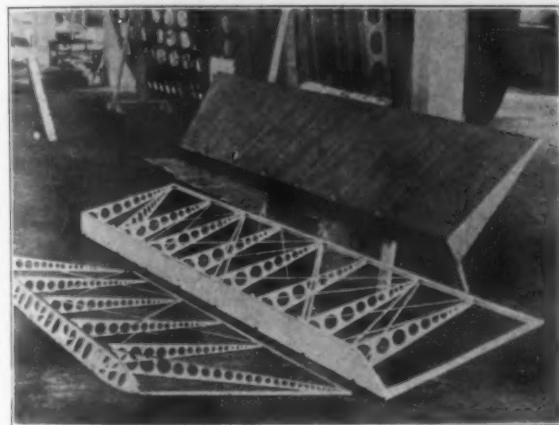
The Fischer-Leaf Company, stove manufacturer, Louisville, Ky., celebrated its fiftieth anniversary with a picnic on the Ohio River at a point below the city on June 13. Charles C. Pfeiffer, founder and president of the company, now 79 years old, actively directed the ceremonies.

Vanadium Steel in Battle Aeroplanes

The field of usefulness of vanadium steel in securing lightness as well as strength is shown in the considerable amount of such steel work used in the aeroplane. The accompanying illustration shows the framework for a wing of a battleplane built for the United States by the Sturtevant Aeroplane Company. The entire craft framework, wings and all, is built of vanadium steel. It is stated that the saving of weight over wood construction, because the sections can be greatly lightened without sacrifice of strength, amounts to 25 to 30 per cent.

The parts of the machine are standardized so that the machine can be built in different sizes by the use of one or more steel units and by the installation of an engine of the horsepower correspondingly required. Thin steel plates form the wing surface. Two armored gun turrets make up the fighting portion of the machine, one on each side of the torpedo-shape body where the pilot sits. These turrets are 8 ft. long and 2½ ft. wide, providing room for a machine gun and the gunner. The fighting men have a view ahead and below, and a clear range for gun fire on all sides, with the added advantage that the two guns can be concentrated for a broadside forward. By tilting the craft laterally both guns may be fired at the same target on the sides. Room is provided for several hundred pounds of bombs.

The engine is of 140 hp. The spread of the wings is 50 ft., with 700 sq. ft. of surface, and the length of



Wing Frames of Vanadium Steel for Battle Type Aeroplanes

the machine is 25 ft. Gasoline and oil tanks are provided with a capacity sufficient for an 8-hr. flight, or roughly, 800 miles. The compartment for the pilot is placed to put him furthest in the rear and at the same time to give him an uninterrupted view in all directions. Armor protection against gun fire is also provided for him. The so-called streamlines are followed, to decrease head resistance, even cables and turnbuckles having been placed in the stream line. The machine can carry a live load of 1200 lb.

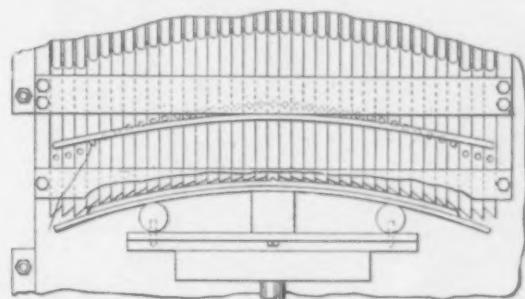
Small Horsepower Direct-Current Motors

A line of bipolar direct-current motors, which are built in either the shunt or compound wound types up to 10 hp., has been placed on the market by the C & C Electric & Mfg. Company, Garwood, N. J., intended for direct connection to all kinds of industrial machinery or machine tools and for other motor applications. The design includes interior commutating poles and a fan placed on the pulley side of the shaft adjacent to the winding, this latter feature being relied upon to give the ventilation required in small sizes of motors having a compact frame.

The Eastern Steel Company, Pottsville, Pa., has asked the City Council to abandon Skidmore Street, a small blind alley. If the request is granted, it is reported the company will make important plant extensions and improvements.

Machine for Forming Elliptic Springs

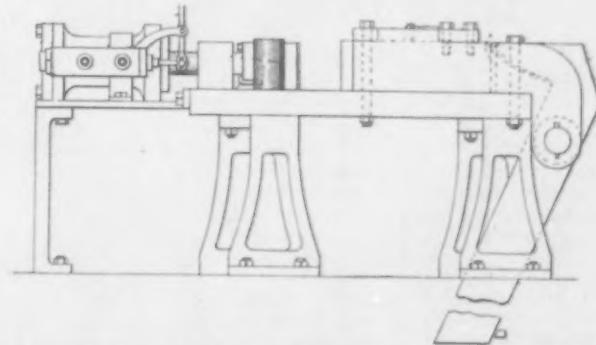
An elliptic spring forming machine in which leaves of the range of sizes and curvatures ordinarily used can be shaped without changing dies has been brought out by Joseph T. Ryerson & Son, Chicago. A bank of thirty-seven keys make up the so-called female die, and are arranged at one end of



Top View of the Machine Showing the Plunger in the Forward Position

a heavy horizontal table supported by five legs, together with the male die and the pressure cylinder behind the latter. A series of counterweight levers that furnish the necessary pressure to set the hot plates hold the keys, which rest on the edge side by side, in a forward position. The cross-head on the piston rod from the pressure cylinder carries forward a cold leaf and hot one, against which it will rest in the completed spring, and counterweight levers furnish the pressure which the die keys must exert in forming the hot leaf. That is, the application of the pressure forces the two leaves against the bank of keys forming the female die, with the result that the hot leaf is bent to the same curvature as the cold one. The hot leaf is then tempered without reheating by immersion in a nearby oil bath and placed on an extension table, upon which it rests until all the leaves have been formed. At this time the entire spring goes to an assembling and banding press similar to the one which was illustrated in THE IRON AGE, Feb. 3, 1916.

Two adjustable dies on the cross-head set to spring the cold template slightly are relied upon to give the proper amount of camber to the hot leaf by causing the radius of curvature of the new leaf to be reduced sufficiently. Where the leaves, as they come from the heating furnace, have not straight



Side View of a Universal Machine for Forming Elliptic Springs Using Keys Held in a Forward Position by a Series of Counterweighted Levers

edges, they are placed in a horizontal position in front of the keys and the edges straightened by a single stroke of the cross-head. One man suffices for operating the machine.

The Hudson Reduction Company, manufacturer of ferrotungsten, at Latrobe, Pa., has appointed N. B. Wittman & Co., 522 Commercial Trust Building, Philadelphia, Eastern sales agents for its product.

RAILWAY SUPPLY EXHIBIT

Only a Few Machine Tools Shown at Atlantic City—Good Showing of Railroad Devices

The exhibit of the Railway Supply Manufacturers' Association, Atlantic City, June 14 to 21, in conjunction with the annual conventions of the Master Car Builders' Association and American Railway Master Mechanics' Association, was, as usual, an imposing affair, though not so large as in 1914. It compared favorably with the show of 1915 and was, perhaps, a little larger.

From a machine-tool point of view the exhibit was disappointing, as there were but two companies which had on view machines which could be strictly classed as machine tools. These were the Warner & Swasey Company, Cleveland, Ohio, and the Davis Machine Tool Company, Rochester, N. Y., both of which received a great deal of attention. The reason for the poor machine-tool showing was the same as restricted exhibits of the same kind last year—the pressure on the builders of standard tools to fill orders. Unsettled labor conditions in the tool-building centers also had an influence in keeping the tool builders at home. Manning, Maxwell & Moore, Inc., New York, which heretofore has had a large and attractive exhibit, this year had a reception booth only. Machinery Hall, therefore, was principally devoted to classes of machinery and devices other than machine tools. In this particular the exhibit was up to the average and accounted successful.

The registration and general attendance at the conventions was good, every section of the country being well represented. The *Railway Age Gazette* reported the proceedings of the conventions in daily editions, as it has done in past years.

Among the exhibitors were the following:

American Car & Foundry Company, New York, N. Y.—Cast-iron chilled wheels.

American Steel Foundries, Chicago, Ill.—Davis steel wheels; Economy draft arms; the Vulcan truck; cast steel bolsters; Ajax, Hercules and Vulcan brake beams; Simplex couplers; Ajax third-point support; Simplex coupler pocket; six-wheel freight truck; springs; miscellaneous steel castings.

Armstrong Cork & Insulation Company, Pittsburgh, Pa.—Nonpareil corkboard; high pressure covering; insulating brick; cork covering for cold pipes and drinking water systems; Linotile for flooring; Armstrong cork brick.

Atkis & Co., E. C., Inc., Indianapolis, Ind.—Circular metal cutting saws of all kinds; metal cutting band saws; hack saw blades; hack saw frames; molding plates; metal cutting hand saws; Atkins Kwik Kut hack saw machine; Atkins saws for all purposes.

Besly & Co., C. H., Chicago, Ill.—Photographs of Besly grinders; samples of the Besly Helmet tempered taps and Besly circler for use on disk grinders.

Byers Company, A. M., Pittsburgh, Pa.—Genuine wrought iron; full weight pipe; pipe bends; pipe coils.

Cambria Steel Company, Philadelphia, Pa.—Wire; wire nails; driving and car axles; Slick deformed steel bars; angle splice bars; steel tee rails; Slick draft gear; Slick steel mine ties.

Carborundum Company, Niagara Falls, N. Y.—Carborundum and Aloxite wheels.

Carnegie Steel Company, Pittsburgh, Pa.—Pyramid of various sizes of Schoen steel wheels for railroad service; also Slick wheels for industrial purposes, 41-in. Schoen wheel for Russian railroads and 21-in. pony truck wheel to show range of products manufactured; cut gear and gear blank; locomotive pistons finished and in blank; bored driving axle; alloy steels; steel cross-ties and joints.

Chicago Pneumatic Tool Company, Chicago, Ill.—Air compressors; fuel oil engines; pneumatic tools; electric tools; speed recorder; self-rotating rock drills.

Crucible Steel Company of America, Pittsburgh, Pa.—Reception booth.

Davis Machine Tool Company, Inc., Rochester, N. Y.—One 12-in. close coupled lathe; one 16-in. quick change gear lathe; one 24-in. set-over turret lathe; one 4½-in. cutting-off machine; one No. 1 keyseater; one 16-in. shaper.

Dearborn Chemical Company, Chicago, Ill.—Boiler feed water treatment scientifically prepared to meet requirements shown by analyses of the waters used.

Dixon Crucible Company, Joseph, Jersey City, N. J.—Graphite lubricants; silica-graphite paint; graphite crucibles; brake cylinder lubricant; pencils; crayons; foundry facings.

Duff Mfg. Company, Pittsburgh, Pa.—Duff high-speed ball bearing screw jacks and journal box jacks; Duff-Bethlehem forged steel hydraulic jacks; genuine Barrett improved geared ratchet jacks; genuine Barrett improved car jacks.

du Pont de Nemours & Co., E. I., Wilmington, Del.—Fabrikoid, superior leather substitute; travel goods; book-binding novelties; ivory, pyralin and florentine shell; manufacturing and toilet sets; chemicals; sporting and blasting powders.

Elwell-Parker Electric Company, New York, N. Y.—One elevating platform truck; one industrial truck; one crane truck.

Fairbanks Morse & Co., Chicago, Ill.—15 to 50 hp. two and three phase, 60-cycle, 220-volt, 900-r.p.m. electric motors with special insulation treatment; rotor complete with half bearing arm for large motor; ball bearing motor with special waterproof insulation treatment; Allen & Bradley overload relay panel.

General Electric Company, Schenectady, N. Y.—Electric motors; starting panels and switches; protective panels; controllers; portable arc welding equipment; motor-driven wood-working machines.

Gibb Instrument Company, Pittsburgh, Pa.—I-Rite pyrometers.

Gilbert & Barker Company, Springfield, Mass.—Battery of lubricating outfits; battery of lubricating pumps in various sizes; two barrel tanks, showing method of welding.

Goldschmidt Thermit Company, New York, N. Y.—Thermit and appliances for Thermit welding; sample welds; samples of carbon-free metals and alloys produced by the Thermit process; large sample weld on a 9-in. crankshaft; materials and appliances for demonstrating pipe welding for welding locomotive superheater units; sample of superheater unit welded by the Thermit process.

Greenfield Tap & Die Corporation, Greenfield, Mass.—Full line of screw-cutting tools; screw plates, taps, reamers, gages, screw-cutting dies; automatic opening dies.

Haring, Ellsworth, New York, N. Y.—Elhar brands of high-speed, alloy and carbon steels; metals and mechanical specialties.

Harrington, Son & Company, Inc., Edwin, Philadelphia, Pa.—Chain hoists and travelers.

Independent Pneumatic Tool Company, Chicago, Ill.—Reception booth.

Ingersoll-Rand Company, New York, N. Y.—Little David chipping, scaling and riveting hammers and drills; Imperial motor hoists; Crown sand rammers.

Jefferson Union Company, Lexington, Mass.—Malleable iron unions, elbows, tees and flanges; locknut unions.

Jenkins Bros., New York, N. Y.—Jenkins Bros. brass globe, angle, gate and roundhouse blower valves; Jenkins disks; car heating disks; oil proof and ammonia packing.

Jennison-Wright Company, Toledo, Ohio.—Kreolite wood block floors, structural timber, ties and piling.

Johns-Manville Company, H. W., New York, N. Y.—High and low pressure pipe covering; underground pipe covering; boiler lagging and cement; stack lining; high temperature cement; sheet packing for high and low pressure steam; steam hammer packing; throttle and air pump packing; coil, spiral and rope packings for all services; pump valves; built-up and prepared asbestos roofing; corrugated asbestos roofing; waterproofing materials; mastic flooring; Transite and ebony asbestos wood; Transite asbestos shingles, smoke jacks and ventilators; refrigerator car insulation; steel passenger car insulation; Sanitor specialties; cold water paint; iron preservative; fire extinguishers; brake blocks; fiber conduit for underground wiring; manual slack take-ups; expander rings; air pump piston swabs; electrical material; lighting fixtures; friction tape; supplies.

Jones & Co., Inc., B. M., Boston, Mass.—Superheat packing for piston rods and valve stems; Musket high-speed steel; Taylor best Yorkshire iron.

Jones & Laughlin, Pittsburgh, Pa.—J. & L. standard fence.

Keller Mechanical Engraving Company, Brooklyn, N. Y.—Automatic profiling machine will be operated for automatically sinking drop forge dies.

Liberty Mfg. Company, Pittsburgh, Pa.—Steam, air and water driven turbines for steam boilers and locomotives; arch tubes and injector pipes; Elliott twin strainers for water and fuel oil; Elliott steam and oil separators.

Lincoln Electric Company, Cleveland, Ohio.—Electric arc welding apparatus; motors.

Linde Air Products Company, New York, N. Y.—Reception booth.

Lukens Iron & Steel Company, Coatesville, Pa.—Reception booth.

McKinnon Chain Company, Tonawanda, N. Y.—Electric welded chain.

Manning, Maxwell & Moore, New York, N. Y.—Reception booth.

Midvale Steel Company, Philadelphia, Pa.—Rolled steel wheels.

Milburn Company, Alexander, Baltimore, Md.—Acetylene gas apparatus including welding, cutting and lighting equipment.

National Tube Company, Pittsburgh, Pa.—Reception booth.

Nuttall Company, R. D., Pittsburgh, Pa.—Electric locomotive, railroad and machine tool gears; flexible couplings; expansion joints.

Nutter & Barnes Company, Hinsdale, N. H.—Metal cutting-off machinery; saw sharpener.

Oliver Iron & Steel Company, Pittsburgh, Pa.—Car coupler centering or adjusting device, designed to enable trainmen to adjust car couplers in making couplings; machine bolts; carriage bolts; track bolts; nuts; rivets; poleline hardware; screw spikes.

Pyrène Mfg. Company, New York, N. Y.—Pyrene fire extinguishers; general fire appliances.

Quigley Furnace Specialties Company, Inc., New York, N. Y.—Thwing pyrometers; Electric Heating Company's electric furnaces; Lalor fuel oil valves; Quigley Hytempite furnace cement.

Railway Materials Company, Chicago, Ill.—Brakeshoes.

Rich Tool Company, Chicago, Ill.—Reamers; drills; bits; rivet sets; chucks.

Ryerson & Son, Joseph T., Chicago, Ill.—Nikrome steel forgings, samples of piston rods, side rods, etc., showing tests; Ulster special staybolt iron; Ulster engine bolt iron.

Simonds Mfg. Company, Fitchburg, Mass.—Hack saw blades; cold metal saws; files; circular saws; band saws; planer knives; hand saws; cross-cut saws; docking saws.

Strong-Kennard & Nutt Company, Cleveland, Ohio.—Adjusto-glas goggles for grinding, chipping and general protection use; Adjustoweld goggles for welding; respirators.

Union Spring & Mfg. Company, Pittsburgh, Pa.—Locomotive, passenger and freight car, electric railroad, machinery and miscellaneous springs; Kensington pressed steel journal boxes; miscellaneous steel castings; pressed steel shapes.

United Engineering & Foundry Company, Pittsburgh, Pa.—Photographs of forging press installations.

U. S. Metal & Mfg. Company, New York, N. Y.—Reception booth.

Warner & Swasey Company, Cleveland, Ohio.—No. 2A universal hollow hexagon turret lathe, with bar equipment, operating on bar work; No. 3A universal hollow hexagon turret lathe, with chucking equipment, operating on chucking work.

Watson-Stillman Company, New York, N. Y.—Thirty-ton telescopic hydro-pneumatic pit jack; air engine driven pump; standard types hydraulic jacks.

Westinghouse Electric & Mfg. Company, East Pittsburgh, Pa.—Reception booth.

Wood, Iron & Steel Company, Alan, Philadelphia, Pa.—Reception booth.

Worth Brothers Company, Philadelphia, Pa.—Boiler tubes.

Wyoming Shovel Works, Wyoming, Pa.—Red Edge track shovels and locomotive scoops.

Yale & Towne Mfg. Company, New York, N. Y.—Railway signal padlocks; indicator padlocks; general service locks; dining car locking equipment; door closers; night latches; dead locks; switch locks; chain blocks of various types; trolleys for transporting hoists; electric hoists; chain parts in process; tested hooks.

Canadian Manufacturers Meet

Attendance was large at the annual convention of the Canadian Manufacturers' Association, held last week at Hamilton. J. H. Sherrard, Montreal, retiring president of the association, in his annual address, after touching on Canada's part in the war discussed at length trade after the war. Canada for years, he said, has given Great Britain considerable preference as an expression of patriotic good-will, and he suggested that perhaps the time had arrived when this would bear fruit, such as a preference to Canada on foodstuffs. Mobilization of Canadian industries was urged and the opinion expressed that the time was opportune for the Government to place the tariff on a scientific basis and above the influence of politics. The shipbuilding industry should be developed. In concluding he reminded his hearers that after the war the problems of reorganization and readjustment, which would be gigantic, the association must be prepared to meet. Col. Thomas Cantley, New Glasgow, was elected president of the association for 1916.

The Asbestos Protected Metal Company, Pittsburgh, will hereafter be represented in Cincinnati, Ohio, and surrounding territory by E. C. Irwin, located in the Union Trust Building.

FURNACE GAS ENGINE DESIGN*

A Resume of Recent Improvements Which Have Increased the Operating Economy

The utilization of blast-furnace gas in gas engines may be considered to date from 1894, when experiments were begun by B. H. Thwaite at the Glasgow (Scotland) Iron Works, and almost contemporaneously similar experiments were independently made at Seraing, Belgium, and at Hoerde, Germany. In 1897 the Cockerill Company, at Seraing, after experimenting on an 8-hp. engine, built the first large blast-furnace gas engine, developing 200 hp. This engine, put into operation in April, 1898, consumed 3.329 cu. m. of gas per horsepower hour. The calorific power of the gas was 981 calories per cubic meter. From this point rapid progress was made, until at present engines of 8000 hp. in 4-cylinder types, and of 3200 hp. in 2-cylinder types have been built by the Cockerill Company.

The latest type of engine built by this company has had unusual precautions taken with it to avoid the accidents common to all large gas engines, such as fractures of the cylinder heads, pistons, piston rods, connecting rods, and the bending or breakage of crankshafts. Higher average working pressures are obtained by the use of a built-up piston, bolted to a ring forged on a rod. The mass of metal presented to the gas flame is reduced, thereby avoiding the danger of preignition or premature explosion. Pressures of 78 lb. per sq. in. instead of the usual 64 lb. can be allowed, thereby securing higher compression and insuring high thermal efficiency and a limited gas consumption.

The governing mechanism allows a speed variation of plus or minus 2 per cent for driving dynamos, while a hand mechanism permits of this being varied while running from 10 to 15 per cent. The conditions of wide speed variation required by blowing engines have been met by a new system of governing which permits the mean speed of the engine to be adjusted as desired to 49, 90, 126 and 262 r.p.m. and to be further varied by governing within 50, 24, 16 and 11 per cent respectively of the mean speeds.

Of successful gas engines of other types probably the most interesting are the high-speed vertical, multi-cylinder engines built by the British Westinghouse and National Gas Engine companies. These consist of units compounded together, each comprising two vertical single-acting four-cycle cylinders, the pistons of which are mounted on the same rod. Each unit drives a crank on the engine shaft and develops, usually, 250 hp. Increased power is obtained by increasing the number of units. The engines run at from 200 to 250 r.p.m., which permits of their use for driving turboblowers. The weight per horsepower of these engines is only about one-half that of horizontal, double-acting, two-cylinder tandem engines.

The latest development in the economic utilization of blast-furnace gas consists in passing the exhaust gases from the gas engine through a boiler and economizer, wherein steam is generated at a pressure of about 114 lb. per square inch. The amount of heat carried off in the exhaust from the engines may be as high as 2600 B.t.u. per horsepower hour. In the arrangement adopted at the Cockerill Works, the gas enters the boiler at about 450 deg. Fahr., and is reduced in the economizer to 230 deg. The gases from four gas engines aggregating 5000 b. hp. are now employed in this manner. About 1.93 lb. of steam per electrical horsepower of the engine is generated by this means, developing about 650 hp. in a steam turbine. The boilers recover about 55 per cent of the heat of the gases and increase the thermal efficiency of the engine about 13 per cent. With an installation of four blast-furnace gas engines, developing 10,000 hp. and costing \$380,000, the cost of the recovery appliances (boilers and turbine) is put at \$46,000. With interest and redemption of capital taken at 13 per cent, and with an annual outlay of \$2,000 for wages and maintenance, the saving to be effected by the recovery of the heat in the exhaust will amount to approximately \$19,400 per year.

*Abstract of a paper by Prof. H. Hubert, Liege University, read at the annual meeting of the Iron and Steel Institute.

Customs Decisions

NAME GOVERNS CLASSIFICATION

The Board of United States General Appraisers, in construing the provisions of the present tariff in the protest case of J. J. Gavin, New York, has decided that the paragraph in the law specifying "finished hinges or hinge blanks" is all-conclusive so far as this class of merchandise is concerned. The firm imported hinges made of steel, carved, and in some instances plated with gold. The collector, having in mind the provision covering metal articles coated with gold or silver, concluded that the articles fell under that section of the tariff and accordingly levied duty at 50 per cent. At the hearing the importer maintained that the articles were specifically provided for under paragraph 123 as quoted above. Judge Fischer, in his decision written for the board and coincided in by the full bench, said it was clear from the testimony that the provision for "hinges" more specifically applied to the merchandise than did the general provision for "articles or wares plated with gold or silver," particularly as the latter provision was qualified by the words "not specially provided for," while the former was not. A reliquidation was directed.

WHOLESALE QUANTITIES CONSTRUED

A rather unusual decision was handed down by the reappraisal division of the board, in which the principle was laid down that a single lithographing machine constituted the "usual wholesale quantities" referred to in the customs administrative act. The merchandise under consideration consisted of heavy lithographing printing presses shipped to New York by George Mann & Co., Leeds, England, between June 24, 1914, and May 12, 1915. Five presses were forwarded in the period, for each of which a separate invoice was provided. Each was invoiced at the list price, less 20 per cent and 2½ per cent, representing the discount. The appraiser of the port held the discount to be too heavy, and appraised the machines on the basis of the list price less 10 per cent, this having the effect of raising the dutiable values. The American representatives of the Leeds manufacturers appealed from the appraiser's disallowance of the full discounts claimed, but Judge Fischer, sitting as a single reappraisal official, affirmed the custom house return. Board 1, after giving the Mann Litho Press Company, the North American selling agent, an opportunity to obtain evidence from England, affirmed the single general appraiser. While the decision as it finally stood upheld the Government's contention, the novel feature related to the evidence regarding the manner of making sales on this line of machinery. The testimony laid before the board disclosed that in England, the country of exportation, the machines are sold direct to users at the list price, less 10 per cent, the importers contending that such sales were not wholesale transactions. The decision said that the testimony sustained the fact that in the ordinary course of trade but a single machine was sold at a time; that the sale is made to the user, sales not being made in England to dealers. From this it was contended the "usual wholesale quantity" under the American tariff law in the ordinary course of trade is a single machine. The decision remarked that the high cost of the presses, around \$10,000 each, indicated that not many machines would be purchased at one time. However, it was brought out that when sold in England a discount of 10 per cent was allowed, while the export discount as mentioned above was more than double. The board held that the home market price under the circumstances would have to govern. A concurring opinion was written by Judge Brown.

A MACHINE TOOL

The customs officials at Boston were reversed in their classification of wire-drawing machines fitted with cutters. The collector returned the machines as dutiable at 20 per cent as "manufactures of metal not specially provided for," whereas the importer, Robert K. Morton, claimed entry at 15 per cent as "machine

tools." It was shown to the satisfaction of the board that the apparatus was fitted with a cutting tool for working on metal and came fully under the definition of "machine tools," as held judicially. The protest was sustained and the collector ordered to make a reliquidation in order that refunds might be paid.

SLIDE RULES

Slide rules used by engineers in making calculations and imported by F. Weber & Co., New York, were held by the board properly dutiable at 20 per cent as manufactures of metal. The custom house authorities held that the articles, being in chief value of metal, were of the kind named in paragraph 356 as "carried on or attached to the person." Under this interpretation, duty at the rate of 60 per cent was taken. The testimony was that the slides were used in making calculations and solving mathematical problems, and by engineers in their offices, being carried only for special purposes. The board decided that for tariff purposes the rules were in the same class as timers, pedometers, compasses, totometers and computers, thus falling under the metal provision at the lower rate claimed in the protest.

FISH NET MACHINES

The board in disposing of a protest by the Linen Thread Company decided that fish net machines imported at Boston were properly dutiable at 20 per cent under the provision for metal manufactures not specially provided for. The collector returned the articles at 25 per cent under paragraph 165 as "machines for making lace curtains, nets or nettings." The importer claimed that a distinction existed between the machines in controversy and those specified in the lace curtain provision. The board agreed and ordered entry at the lower rate.

PIPE, DEFECTIVE BUT UNUSED

The I. Lanski & Son Scrap Iron Company, and others were before the customs tribunal as protestants against the action of the collector at Chicago in assessing 20 per cent duty on unused butt-welded iron and steel pipe which came from the mill defective for high-pressure purposes. The appraiser reported that the purchase price of the material indicated that it was a much higher grade than scrap steel. Furthermore, the appraiser stated his investigation showed that the article entered into consumption as pipe, being cut into lengths and used as guard rails, fence posts, rollers, building columns or supports and lawn fences. The collector's assessment was under paragraph 127 dealing with butt-welded pipe. Free entry was claimed as scrap steel fit only to be remanufactured. The board stated that no proof was submitted showing that the pipe was to be used exclusively for scrap, while in other instances the importers failed to show what proportion, if any, was used as scrap. The collector was affirmed.

Care of injured employees by the first aid corps of the works, throughout the duration of the injury, is illegal, at least in Pennsylvania. The April monthly bulletin of the Pennsylvania Department of Labor and Industry calls attention to the fact that this practice is illegal and that the first aid corps can only render such service as is required to save life, or render the injured person more comfortable until the arrival of the physician. The practice of some plants in having the first aid men treat a case from beginning to end without the case first being seen by a licensed physician is not only a violation of the law, but in some instances has resulted in serious harm to the injured man.

The Greenville Boiler & Sheet Iron Works, Greenville, Miss., which will hereafter be known as the Greenville Boiler & Machine Works, has built a steel and concrete addition to its plant. It has just installed 18, 24 and 36 in. lathes, one 36 x 36-in. American Tool Works two-headed planer, one 24-in. Rockford shaper, one 42-in. gang radial drill and the necessary small tools, proposing to operate a first-class machine shop for general repair work, in conjunction with the boiler department.

Fair Recompense*

BY DAVID J. CHAMPION†

It has been my privilege and pleasure to have been with you for nearly twenty years. I have heard a great many suggestions made, and I have heard some eloquent speakers—some witty speakers, some wise speakers, and some otherwise—but, when all has been said and done, the question that presents itself is, What has been accomplished? In other words, what are we here for? From a worldly point of view the answer is, To save our bodies, to perpetuate our lives, our homes, and our progeny. In order to do all this, we must get a fair recompense for our labor so that we shall be able to live respectably, educate our children properly, and conserve our resources so that we shall not be forever a menace to our creditors and our bankers, and a worry to our families and our friends.

Your labor is of the most arduous and at the same time of the most intelligent kind. No one works harder than the boiler maker, and no one is required to work more intelligently. Life and property depend upon your labor, as the product you manufacture is constantly threatened with destruction and deterioration.

The importance of fair recompense for your labor, therefore, is paramount. The great tendency on the part of many manufacturers is to underestimate the value of their product, and this comes mainly from the fact that a great many of you were once artisans yourselves—paid by the hour, trained in the shop and not in the office—and it is, therefore, hard for you to get over the habit of estimating hourly recompense added to the cost of material. Without seeking to criticize, I feel like saying that some of you seem to be forever figuring how cheaply you can estimate your product and shade the price you think your competitor is likely to bid.

SERIES OF COMMANDMENTS SUGGESTED

It seems to me it would be a good idea to formulate a series of commandments and call them "The Commandments of Progressive Boiler Making," these commandments to be religiously applied to every estimate before it leaves your office:

1. Quote the present market value f.o.b. your works for all material entering into the fabrication of the structure on which you are figuring (do not take advantage of a low-priced material contract if you have one).
2. Full cost of handling from the inception of the material into your works, to the completion thereof, and loading for shipment.
3. Cost of labor, laying out, shearing, punching, bending, riveting, calking, testing, painting, etc.
4. Add a fair percentage (estimated on actual figures covering a year's business) for overhead, such as: Interest on the entire investment; taxes and insurance; salaries of general office, clerks, etc.; fair dividends, compatible with what you could get for your money if intelligently invested; depreciation of plant, etc.; cost of accident insurance, and possible loss sustained by accidents in your plant.
5. Use the time clock judiciously and make it help you in your work of knowing how much time you worked on any one job.

A SUGGESTION AS TO BIDS

If I may be permitted to go a step further, I would suggest that you appoint an impartial and capable general engineer and estimator, paid jointly by your association, whose duty it should be to examine all important estimates and O. K. them before the price is named. This would entail your furnishing this supervising engineer an exact copy of your bid before it is made. This would be for the purpose of comparing it with the bid of your competitor, not with the view of materially changing your bid, but with a view of checking you up, so as to prevent abnormally high or abnormally low prices. These bids could be marked with a cipher

*Address before American Boiler Manufacturers' Association, Cleveland, Ohio, June 20, 1916.

†President Champion Rivet Company, Cleveland.

word, the meaning of which would be known only to your supervising engineer, thus precluding the liability of criticism from any one. Your engineer could furnish you with the amount of your competitor's bid without mentioning names, and you would then be able to determine whether you would care to revise your bid or not. Each shop has its advantages or disadvantages according to its equipment in turning out work, and bids should be based on taking advantage of the facilities you have in manufacturing as compared with your competitor, without giving away the entire benefit of your superior equipment—all of which cost you time, money and experience—simply to augment the surplus in the bank to the credit of the purchaser.

Avarice, spite and retaliation should be eschewed from your vocabulary of business ethics, as these things only sow the seed of discontent and failure, and while at times you would feel like "getting even" for some alleged wrong, by resorting to the tactics above mentioned, you are only dragging yourselves deeper into the "slough of despondency."

"The truth shall make you free" is an axiom as old as Christianity, yet in business we seem to avoid it when we are trying to play the game, as we think, shrewdly. If the truth shall make you free, certainly falsehood shall make you slaves.

For instance: If A tells B openly, for the sake of establishing a basis of price, that he is going to bid \$1,000 on a certain job, there is no law under the sun that can prevent B from quoting the same price. No Sherman law, or any other law, can prosecute B from getting as high a price as A. It is only secret understandings and agreements that are open to prosecution. This is the sequel to the success of the Eddy plan now in successful operation by a great many manufacturers.

AVOIDANCE OF BARGAIN COUNTER PRICES

The days of bargain counter prices in boilers are passed. Consumers who are in the habit of paying a larger price for everything of real value naturally look with suspicion on low-priced boilers, and those who feel an innate confidence in the worthiness of their work are the last ones to name ridiculously low prices on their product. I could name many among you, who, if they told the truth, would acknowledge that they had not made any dividends in years, and sometimes have had nothing to pay for depreciation and replacements.

I have tried to lay before you a few facts as seen by an interested friend, and I know from a knowledge of the personnel of your organization that you can formulate some plan for your material advancement that will amount to more than mere glory, sorely tainted with financial disappointment. I say all this, not merely from a friendly and philanthropic standpoint, but from a selfish standpoint as well. Which one of you, no matter how big a business you are doing, is a desirable risk if every one of us who are supplying you with material has an honest suspicion that you, by reason of your cut-throat prices, are losing money or just breaking even? Hardly a month passes by but that some one of you are under consideration and inquiry by some money lender who is diligently making inquiries as to whether or not you are worthy of credit. You might as well come to the conclusion now that the days of low prices are the days of the past and peculiar to an age unenlightened by modern requirements. We are growing old in the service and after twenty-five years of hard and painstaking work there is nothing left but gray hairs and physical incapacity.

I am only trying to place before you my views as to how your work appears to the outsider. I trust something of advantage will be started, and that you will see it is to your interest to take hold and make such changes as will eventually revert to your permanent stability and financial advancement. Now that the A. S. M. E. code is being, or soon will be, adopted by all the States, you have the basic element of just and intelligent figuring fairly before you, and there is no good reason for a great divergence in prices. May success attend your efforts.

Standard Boiler Code and Depreciation

The Two Topics of Interest at Opening Sessions of Twenty-eighth Annual Boiler Manufacturers' Convention at Cleveland

A REPORT of the headway that is being made toward the establishment of a standard boiler code known as the A. S. M. E. code in the various States, and the discussion of several topics in connection with the general subject of depreciation were important features of the first day's session of the twenty-eighth annual convention of the American Boiler Manufacturers' Association, held at the Hollenden Hotel, Cleveland, Ohio, June 19 and 20.

The report on what has been accomplished by the efforts that are being made for the adoption of the A. S. M. E. boiler code by the American Uniform Boiler Law Society was presented by Thomas E. Durban, Erie City Iron Works, Erie, Pa., chairman. He stated that in New York the Bewley bill which was backed by the society was passed unanimously by the Assembly and Senate, but was vetoed by Governor Whitman. The reason given for the veto was that legislation was unnecessary as the Industrial Board claimed to have full authority and would adopt the code for the State if it were given an opportunity to do so. The committee expressed the opinion that this was more desirable than having the code adopted by the Legislature for the reason that when it is in the hands of the Industrial Board no changes or corrections in the code can be put in operation without again referring the matter to the Legislature. Mr. Durban said there was no reason to doubt the good faith of the Industrial Board and that it had already signified its intention to call a committee together to discuss the matter of the code and that the committee was very much pleased with the progress made in New York.

In Louisiana a bill has been introduced in the Legislature authorizing the governor to appoint a committee to draw up rules relative to the construction of steam boilers. The outcome of this is uncertain but a large number of users of boilers in the State have become interested in the matter and indications are favorable for the passage of the bill. In Michigan a bill will be presented at the next session of the Legislature by John C. McCabe, head of the Detroit inspection department, and the society will start an educational campaign in that city very soon. Mr. McCabe will have the active assistance of Prof. John R. Allen, professor of mechanical engineering, University of Michigan, Ann Arbor, Mich., in the work before the Legislature. Two years ago efforts to provide a uniform code in Michigan were defeated because large interests were not at that time familiar with the provisions of the code.

Efforts are being made to secure the adoption of a uniform code in Alabama, and there are hopes that this will prove successful. Some progress has been made in the city of Chicago and the committee hopes in the near future to be able to announce that the inspection department of that city will accept a code boiler. Particular attention has been devoted to Texas where some progress has been made. The Ginners' Association of that State and the Texas Cotton Seed Crushers' Association, the latter composed of oil mill industries and one of the largest organizations in the State, have approved of a code, and Governor Ferguson expressed himself to Mr. Durban as being in favor of this legislation. The chairman stated he had devoted a great deal of time to Texas because of the fact that the State is a large user of boilers and if it adopts the code its action would have a great deal of influence on other Southern States. In Kansas a bill providing for a uniform code will be introduced in the Legislature, and in St. Louis the code is now before the Council and the report states there is no doubt of its final passage.

Mr. Durban called attention to the fact that there is great danger in securing enactments of the desired code in various States by reason of its being linked to other

measures along the same line, that is the boiler inspection and engineer's license bills. He said the code must stand on its own bottom when being put through the Legislature and must not be tied up with any other proposed legislation. He thought that if three or four more prominent States which use the most boilers can be persuaded to adopt the code the movement will then have a momentum to carry itself much further with less effort than has been necessary to put on it this year. In this connection he recommended that a committee be appointed to decide upon what States efforts for the adoption of the code should be centered in the coming year. His suggestion was approved by the appointment by the chairman of a committee for that purpose composed of T. E. Durban; E. R. Fish, St. Louis, Mo.; I. Harter, Jr., New York City, and H. M. Covell, Brooklyn, N. Y.

Mr. Durban stated that efforts to provide the uniform code had been given very hearty support by the American Society of Mechanical Engineers and had received a fair amount of support from the boiler makers. Of the \$12,000 raised to conduct the campaign, \$2,000 remains in the treasury and all bills have been paid.

George D. Luck, a representative of the Massachusetts Board of Boiler Rules, explained the numerous changes that have been made in the Massachusetts code to go in effect in July, and a representative of the same board referred to trouble that had been caused by a provision of the code regarding the tensile strength of steel castings. He said that founders would not furnish steel castings with a tensile strength lower than 60,000 lb. and give the assurance that they were good castings.

THE AFTERNOON SESSION

At the opening of the afternoon session resolutions were read and adopted as a memorial to J. D. Farasey, for 19 years secretary of the association, who died last January.

President W. C. Connolly, D. Connolly Boiler Company, Cleveland, in his annual address referred to the enormous increase of the iron and steel business in the past year and to the advances in prices for boilers, but he expressed doubt whether boiler makers will make the profits for the year that they anticipate. His personal observation was that for a considerable period after the prices of steel plates and tubes were advanced, a number of concerns continued to quote low prices, giving the customer the advantage of the low contracts on plates and tubes. He said that from personal experience a dollar expended for productive labor does not yield the same returns that it did a year ago. Membership in the association showed an increase of fully 25 per cent in the past two years, but efforts to induce all concerns to join have not been successful. He spoke of the benefits of the organization, one of which was the uniform boiler code that he said would soon be a standard throughout the United States.

He recommended that the office of the secretary and treasurer be vested in one person. Since Mr. Farasey's death his duties have been looked after by Mr. Connolly, and by the treasurer, H. M. Covell.

During this session a technical paper on "The Effect of Sulphur in Steel" was read by Dr. J. S. Unger of the research bureau of the Carnegie Steel Company, and the National Tube Company presented its moving pictures showing the making of steel pipe from ore to the finished product.

The question of depreciation was the general subject of discussion during an open debate that took up the remainder of the session. Mr. Covell read tabulated figures which he had received from twenty-three boiler makers showing the amount that they believed should

be charged against plants for depreciation. This depreciation ranged from nothing to 10 per cent for factory building, from 2 to 25 per cent for power equipment and from 4 to 9 or 10 per cent for machine tools. The average depreciation for buildings, as shown by the tabulated figures, was 4.19 per cent. Some of the speakers expressed the opinion that a fixed basis cannot be established for depreciation, which is bound to vary. One speaker said that his company fixed the depreciation on brick and steel buildings at 2½ per cent, on machinery and tools 10 and 15 per cent, and on boilers and power house equipment 5 per cent. One or two said that the fact that a building or machine would become obsolete was of more importance in fixing the depreciation than the wearing out of the machinery or building.

In this connection one of the speakers stated that Safety First is likely in a short time to drive boiler makers to the substitution of drilling for punching machinery, calling attention to the fact that in Ontario, Canada, a law recently went into effect requiring that drilling machines must be used in making holes in all plate material that is being fabricated for pressure purposes. It appeared to be the general sentiment that 5 or 6 per cent interest should be charged on the total plant investment in addition to the percentage for depreciation before figuring actual profits.

CHANGE IN NAME OF ASSOCIATION

A change in the program was made, and a session was held Monday evening when a large part of the program arranged for Tuesday afternoon was carried out. This enabled the convention to finish its proceedings Tuesday forenoon, and the afternoon was spent in a visit to the plant of the Otis Steel Company. A new constitution and by-laws, prepared by C. V. Kellogg, first vice-president, and H. N. Covell, treasurer, was submitted and adopted. This included a change in the name of the organization from the American Boiler Manufacturers' Association of the United States and Canada to the American Boiler Manufacturers' Association. It is explained that while the Canadians will always be heartily welcomed in the organization, Canada was left out of the name for the reason that the Canadian boilermakers with one or two exceptions were not members and do not attend the meetings.

A nominating committee was appointed, consisting of J. A. McKeown, St. Louis; C. M. Tudor, Cincinnati, and Michael Fogarty, New York. The report of Treasurer Covell showed that the deficit of \$500 had been wiped out and that the association has \$245 in the bank.

LABOR COST KEEPING

An address was presented by David J. Champion, president of the Champion Rivet Company, Cleveland, on "Fair Recompense," and was accorded hearty applause. It is given at some length elsewhere in this issue.

The method of obtaining correct labor cost was also discussed. The general sentiment was that all labor that can be directly charged against the job that is being fabricated should be included in the productive labor cost, and various methods of cost keeping were referred to. Mr. Covell said his company had recently installed a mechanical time recorder which was proving very satisfactory. While some of the boilermakers stated that they provided workmen with cards on which the men indicate the time when starting and finishing a certain job, objections were made to letting the men keep their own cards on the ground that these cards in many cases would not be filled out properly; some of the speakers thought that this should be attended to by a shop clerk or timekeeper. Frederick W. Plank, Oil Well Supply Company, Oswego, N. Y., stated that the boiler works department of that company, making mostly locomotive boilers, was using the bonus system, all of the 164 operations with their standard times being listed on one sheet. The workman has to have a ticket for every job, and if he completes the operations in less time than the standard time, he is allowed half the time saved and the company the other half. G. W. Bach, Union Iron Works, Erie, Pa., suggested that a standard cost system

might be devised with modifications to suit individual plants.

On request, President Connelly described the cost system in use in the plant of the D. Connelly Boiler Company, Cleveland. This system requires a time-keeper who does nothing else. The employee has a card for each job, and this is kept in a pigeon hole, and on it are stamped the time of starting the job and the elapsed time. If a man works on several different jobs during the day, his pigeon hole will contain as many cards, all being a record of his work at the expiration of the day. The cards are recorded on an assembly sheet that is made up daily, so that every morning the company has a record of the exact cost of the job up to the night before.

TUESDAY'S PROCEEDINGS

At the Tuesday morning session C. V. Kellogg, first vice-president, delivered an address in which he discussed trade conditions generally, and expressed his belief that the countries now engaged in war will not be able to supply the demand which is necessary in their own countries for at least three years after the end of the war. Dwelling on the labor situation, he said that the enormous profits that some manufacturers have made have created abnormal labor conditions, and that we are going to face one of the most serious problems this country has ever encountered and we know not where we are going to land. He said he knew that some of the large business interests of this country are setting up a reserve and are adding it into their cost of doing business to take care of what they must lose by reason of labor conditions which they must face in the next three years.

E. R. Fish, as representative of the association on the executive board of the Uniform Boiler Law Society, made a report in which he set forth the financial end of the work.

D. M. Metcalf, chief inspector of boilers for the Province of Ontario, gave an interesting talk on the boiler requirements and inspection in Ontario and the operation of his department. A uniform boiler code has been adopted by three of the Canadian provinces, and he said he was in favor of having a uniform code that would apply throughout both the United States and Canada.

A paper on the "Standardization of Steam Nozzles on Water-Tube Boilers" was presented by a representative of the Crane Company, Chicago, and was followed by a general discussion.

Mr. Fish said there had been a great deal of discussion on the subject of overhead, and that the association had reached no conclusion. He moved that a committee of three be appointed to draft a suggested form of accounting for expenses and costs to be submitted to members either between now and the next meeting or at the next meeting. Mr. Kellogg moved as an amendment that the matter be referred to the executive committee, which should provide a uniform basis of cost figuring covering only the general principles, including depreciation, etc., leaving for each manufacturer the working out of the details himself, and that the executive committee be instructed to send the drafted form out to each member for criticism. Mr. Kellogg's motion was adopted with an amendment that copies be sent to all companies or firms interested in the boiler business.

The convention closed Tuesday evening with a banquet at the Hollenden Hotel.

OFFICERS ELECTED

The following officers were elected:

President, M. H. Broderick, Broderick Boiler Company, Muncie, Ind.

Vice-president, C. V. Kellogg, Kewanee Boiler Company, Kewanee, Ill.

Secretary and treasurer, H. N. Covell, Lidgerwood Company, Brooklyn, N. Y.

Executive committee, E. C. Fisher, Wickes Company, Saginaw, Mich.; G. S. Barnum, Bigelow Company, New Haven, Conn.; I. Harter, Jr., Babcock & Wilcox Company, New York, and Louis Mohr, John Mohr & Son Company, Chicago.

ESTABLISHED 1855

THE IRON AGE

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Published Every Thursday by the DAVID WILLIAMS CO., 239 West Thirty-ninth Street, New York

W. H. Taylor, *Pres. and Treas.* Charles G. Phillips, *Vice-Pres.*

Fritz J. Frank, *Secretary*

M. C. Robbins, *Gen. Mgr.*

BRANCH OFFICES—Chicago: Otis Building. Pittsburgh: Park Building. Boston: Equitable Building. Philadelphia: Real Estate Trust Building. Cleveland: New England Building. Cincinnati: Mercantile Library Building.

Subscription Price: United States and Mexico, \$5.00 per year; single copy, 20 cents; to Canada, \$7.50 per year; to other foreign countries, \$10.00 per year. Entered at the New York Post Office as Second-class Mail Matter.

One Peril of War Prosperity

Some of the prophets of prosperity for the United States after the war consider it assured by the accumulation here of a larger share of the world's wealth than this country has ever had. It is held that with so much capital in the hands of its bankers, investors and manufacturers, that must be set at work, it will enter upon its greatest period of construction and expansion. There is not a little to sustain the view, leaving out of the account the effects of Europe's decimation and depletion, and forgetting for the time that half the world cannot get real prosperity out of the ruin of the other half.

Simply to illustrate considerations not usually taken into account in such prosperity forecasts, an interesting phase of current work in credits may be mentioned. It is the special attention very important iron and steel interests are giving to cases of dissension in manufacturing companies which buy iron and steel products. There has been a year of profits for a good many manufacturers beyond their wildest dreams. A year of profits as great or greater seems to be ahead of them. In the lean years before war prosperity came, partners and corporation officers pulled together to weather the storm. Under stress every energy was bent to one end. But inordinate profits pouring in brought a harder test than any that came from depression. Sudden wealth has always had its perils, and unexpected earnings have brought divided counsels in a number of organizations. On the one hand is the partner who would extend capacity at once, in preparation for the greater trade to which recent successes point. War or no war, he is convinced that his company has taken new position in its field and must push its advantage promptly. The more cautious, perhaps more experienced, partner argues for the conservation of profits and against the taking on of new responsibilities until there is better light on the future. He sees the possibilities of just as many surprises ahead as the war already has brought, and of some that may prove far less agreeable. He knows there is a labor problem made doubly difficult by the war, and that it bars the way to economical production.

These differences of view have gone to the point of changes in control in some cases and in others reorganization is imminent. Many manufacturing extensions have been made that are amply justified.

Others are being planned that likewise represent intelligent and courageous laying hold of opportunities created by the new conditions, and will bring added profits and prestige. It is just as true that many like projects are unwise and that entrance upon them will mark a turning point from which the road to financial complications and disruption will not be long.

The British Steel Industry

Statistics of steel production in the United Kingdom in 1915 furnish at least a partial answer to the question that has probably been asked frequently, what the British steel industry is doing in these war times. The statistics are practically complete as to the output of finished rolled steel, but similarly complete statistics for previous years were not gathered, hence it is impossible to make comparisons. The total output is given at 6,325,844 gross tons, but this includes 177,071 tons of castings, deducting which, 6,148,773 tons is obtained as a statement of the rolled steel output of the United Kingdom, made up in substantially the same manner as the American statistics of rolled steel, with the unimportant divergence that in the British statistics pipes and tubes are weighed as such while in the American statistics the item skelp is taken. The rolled steel output is 74 per cent of the output of Bessemer and open-hearth steel ingots, showing approximately the same proportion of rolled steel to ingots that obtains in the American industry, despite the fact that the alignment as to steel processes used is quite different, the British steel industry running less to Bessemer than does the American, while incidentally it produces a relatively large tonnage of acid open-hearth steel.

In these war times one is naturally interested in a belligerent's production of steel rounds. The British statistics show 534,503 tons of "general merchant steel (not included under angles and girders, etc.)," but as the exports of steel bars in 1915 have been reported at 489,464 tons there would be left only 45,039 tons for home consumption if all steel bars, including shell rounds, were included in the category. The only other item under which they could be included is the "other products," which are given at 770,981 tons, but even that would not leave much, seeing that the exports of steel bars to France, reported at 349,297 tons, can

have included little but shell rounds. One must conclude that the British steel industry is making no large tonnage of rolled rounds for consumption by British shell factories, presumably a considerably smaller tonnage than is being made in the United States.

There is a statement of billets made for sale, domestic or export, and such billets as are rolled at home undoubtedly appear again in the statistics of finished rolled steel. The total billet tonnage given is 943,545 tons, about one-third Bessemer and two-thirds open-hearth, and a portion of the latter may have been forging billets for shell manufacture, but no more than a very few hundred thousand tons.

While the United States exported 391,762 tons of steel rails in 1915, the United Kingdom produced only 446,402 tons, but of this output 242,289 tons was exported, so that despite the small British production of rails the exports were 62 per cent as large as those of the United States.

The other items of finished steel manufacture are all relatively small, with the exception of the following:

	Gross Tons
Plates, $\frac{1}{2}$ in. and heavier.....	1,160,327
Angles, tees, channels and sections.....	762,717
Girders, joists and beams.....	343,617
 Total	 2,266,661

The above-named products comprised 37 per cent of the total finished steel produced. In normal times the production of corresponding material in the United States is 27 per cent of the total, despite the fact that in this country there is a heavy demand for structural shapes and plates for large buildings and a heavy demand for plates for large pipe lines and oil tanks. It is quite evident that by far the major portion of the British plate and shape production indicated above was for consumption in building ships, both war and merchant. Clearly the British steel industry is making much more steel for ships than for shells. The exports comprised 148,037 tons of plates and 57,126 tons of girders, joists, etc., leaving more than 2,000,000 tons for the home consumption.

The production of galvanized sheets was 353,593 tons, of which 286,446 tons was exported. The trade has fallen off greatly, through the influence of high cost of spelter and other war dislocations, for in 1913 the exports alone were 762,244 tons.

The production of tin and terne plate, including what are known in the United States as "long ternes," amounted to 603,386 tons. This appears to be the first precise statement as to the volume of British tin-plate production. The tin-plate exports in the year, 368,602 tons, were the smallest in ten years, the largest in ten years having been the 494,921 tons exported in 1913.

Small-Town Shops and Skilled Labor

The machine shops of the smaller towns have not suffered in the competition for skilled labor as much as those of the larger industrial centers. They have been compelled to advance wages, but so have all others. The lure of the city has not prevented them from largely increasing their organizations. Their employees, taking in a large percentage of young men, have accepted a life which has in it

little of excitement. Those works which have profited by this trend of migration countryward include great machine-tool building shops of isolated towns, which, being literally deluged with orders, have been able to increase their producing capacity to a point far beyond what it had ever been before.

One reason for this is that good mechanics have sought out those places where they would be assured of steady employment and avoid the risk of being drawn into labor troubles. The disturbances in some of the larger places have driven men away and kept many others from seeking employment there. Another reason is the difficulties encountered in some of the cities in getting suitable homes or decent boarding places. Rent and board advanced with the increased demand, until they became factors of serious importance, in spite of the abnormally high wages in the cities.

Owners of works in the small places have had to deal with these problems before, and this experience helped them to solve the problem of providing homes for families and boarding places for the others. The building up of agreeable social life for employees had also had attention. While existence is quiet in such towns, it still affords plentiful opportunity for amusement. It is a clean, decent life, and the kind of a man who likes it is usually a very desirable workman. He is thrifty, and with small opportunity for extravagance there is little of the frittering of money which has become so serious in city life. Of course, living is cheaper. With this class of labor the shop suffers a minimum of idle hours. Men do not take time off unnecessarily.

These small out-of-the-way towns have the great advantage of being able to recruit labor from a large surrounding country. Young men from the farms are the best of new material for a machine shop. They are quick to learn and are not afraid of work. In dull times they may go back to the farm to fill in the gap. Some of them drift to the cities later. Others marry and settle down, to become permanent parts of the working force. Still others who have been attracted to these places in the last year or two will make them their permanent homes, especially men with families. They realize that the life there is better for them and for their children.

The Decline in Metals

The commoner metals, copper, spelter, lead and tin, have undergone material declines in price in the past few weeks. Only recently copper, lead and tin showed their highest prices since the war started, copper early in May, lead late in March and tin early in April. Spelter showed a subsidiary high point at the middle of April, but the price was much below the record high price reached in June, 1915. Thus the metals have moved quite well together recently, the general declining tendency being marked.

A study of the prices of these metals in the past, with reference to the market movements in the steel industry, shows rather a remarkable parallel. When a general and pronounced buying movement in the steel industry has practically come to an end, as in the early part of 1907, and about the end of both 1909 and 1912, these four metals have been found

with scarcely an exception to be at a high point, while an extended decline would then begin.

The parallelism is not between metal prices and steel prices, but between metal prices and steel buying. The steel mills continued very active, with steel prices unchanged, for many months after the active buying of steel ceased, and thus the harmony is between metal prices and steel buying. As metal prices reflect very promptly the relation between the quantities sought and offered in the open market they reflect the buying. In the case of steel, prices do not fluctuate but rather move in long swings. The buying in a regular steel movement is done for far forward delivery, and on account of the nature of some of the contracts entered into the steel mills have a vital interest in maintaining their prices at a time when demand has become light, but there is still a large tonnage of business on books.

At this time the harmony between metal prices and steel buying is more or less apparent. While the largest gain in the unfilled obligations reported by the United States Steel Corporation during this movement occurred last November, there was a subsidiary maximum in March, the gain in that month being greater than in any of the three preceding or the two following months—and the report for the current month will make it three following months instead of two.

The war has dislocated things so generally that it is of considerable interest to find the same course followed by metal prices as has been followed in previous market movements. The fact may be significant or may represent only a coincidence. The comparison shows, in any event, that the decline in the metals is not to be taken as foreshadowing a decline in steel prices, or a decrease in steel producing activity, in the next few months.

The declines in copper and lead do not affect any branch of the steel industry to a noticeable extent. The decline in tin reduces somewhat the hard burden of the tin-plate mills, which have been in a very uncomfortable position through their raw materials and labor having advanced since the season contracts were made, contracts that, unfortunately for the mills, involve by far the major portion of their output for the year. The high prices now ruling for tin plate are of very little advantage to the mills, as they have had so little surplus product to sell.

The decline in spelter has begun to be promising for a revival in the sheet galvanizing industry, which has languished for a year with an average of between 30 and 40 per cent of normal production, a considerable displacement by painted sheets having taken place. Figuring merely on the basis of cost of manufacture, 12 or 13 cent spelter should not be prohibitive, since compared with 5-cent spelter it adds no more than a cent a pound to the cost in making 28 gage, and less in the case of heavier gages. The galvanized sheet market, however, labors under another and important disadvantage besides the one of price. The fluctuations in spelter have been so violent that both sellers and buyers have become timid. The seller has difficulty in reaching any conclusion as to when or to what extent he should cover on spelter against sales of galvanized sheets made or to be made, while the buyer hesitates to buy, fearing a possible decline in the galvanized sheet market due to a possible decline

in spelter. If the prices of spelter and galvanized sheets were assured of no change for three or six months there would undoubtedly be much more buying and selling at the prices now current. Some of the sheet galvanizers have lately expressed an intention of "taking hold" whenever spelter reaches a 10-cent level, then abandoning their present very conservative policy, but the outcome of such plans is not always in keeping. Spelter might be found to look dear if it reached 10 cents, though of course the risk in buying it would be vastly reduced as compared with the 25-cent spelter market of a year ago.

Frank Baackes on Industrial Preparedness

Frank Baackes, vice-president and general sales agent of the American Steel & Wire Company, Chicago, was the guest of honor and principal speaker at a dinner given by the Chamber of Commerce, Cincinnati, at the Cincinnati Zoo clubhouse on the evening of June 19. Over 500 were present. Mr. Baacke's subject was "Industrial Preparedness." He said among other things: "Business men should pay more attention to politics, because politics is a great part of industrial life. If the average man looked after his business as he looks after politics, there would be no business. There are too many lawyers and professional politicians in our administrations to-day; they know little or nothing of practical business and its needs. The difference between a lawyer and a business man is that a lawyer can lose his case and still get his fee, but if a business man loses he is done for and in many cases bankrupt."

In commenting on present conditions, Mr. Baackes said that he did not like to make predictions, but that it was quite probable that present prosperity would last through any armistice that might be declared, and that the crucial time would come when peace is declared and when the workers in Europe get back to work. Protection for the American manufacturer, workman and merchant could only come through an adequate tariff. As to the export trade, the speaker emphasized the fact that not only is a merchant marine necessary, but efficiency in salesmanship is also very important, while the question of proper banking facilities in foreign countries is one that cannot be overlooked in any circumstances. "Not to take advantage of our opportunity and prepare now seems almost like criminal negligence. It certainly is business negligence."

Mr. Baackes was introduced by William B. Melish, president of the Cincinnati Chamber of Commerce. Other speakers were Royal Mattice, manager of sales, American Steel & Wire Company, at Cincinnati, and Major J. D. Crawfis, who spoke on military preparedness.

Tungsten Ore Much Lower

The tungsten ore market has suffered a decided slump in the last few weeks and 60 per cent concentrates are obtainable, it is understood, at \$30 to \$40 per unit. Less than \$30 has been quoted for some grades. This is a decided contrast to conditions only a few months ago. In February, 1916, the concentrates sold as high as \$105 per unit and for some time after that considerable quantities changed hands at \$70 to \$75 per unit which was the quotation for some time. In 1913 and 1914 the price was \$6 to \$7 per unit. The present low prices come as a result of extensive prospecting here, in South America and other countries, coupled with lack of demand by tungsten smelters. Offers of lots by speculators have also unsettled the market. There is now a fair foreign demand for ferrotungsten and tungsten metal and should this result in orders, the ore market will probably be stimulated. Price of the metal and alloy has receded from a range of \$8 to \$10 per lb. of contained tungsten to \$6 and \$7, with evidence of some sales below \$6. There is very little buying of either ore or alloy, though France and Russia are reported inquiring for large quantities of ore.

DECISION ON SPECIAL RATES

Railroads Not Justified in Considering Uses for Iron and Steel Products

WASHINGTON, D. C., June 20, 1916.—That carriers are not justified in specially classifying standard forms of iron and steel because they may be designed for special purposes is a principle laid down by the Interstate Commerce Commission in a decision in the case of the Casey-Hedges Company et al vs. Cincinnati, New Orleans & Texas Pacific Railway Company. The complainants, including the Casey-Hedges Company, Converse Bridge Company, Chattanooga Boiler & Tank Company, Walsh & Weidner Boiler Company and John C. Vance Iron & Steel Company, are corporations engaged in business at Chattanooga. They allege that the rate maintained by the defendant carrier for the transportation of various iron and steel articles, including boiler tubes, structural material, bar iron, bar steel, wrought-iron and steel pipe, iron and steel plates (16 gage and heavier), and iron and steel rivets, from Cincinnati to Chattanooga, is unreasonable and unjustly discriminatory. A carload rate of 23c. per 100 lb., minimum 30,000 lb., applicable on "special iron" articles, was assessed on the shipments in question, but complainants sought to have the articles referred to removed from the list of those taking rates on "special iron" and to have them given a lower specific rate of 12c., minimum 36,000 lb. The 23-cent rate is not only a local rate but serves as a basis for the construction of through rates from points north of the Ohio River. Most of the traffic to complainants comes from Pittsburgh.

Protesting against the inclusion of the articles in question in the category of "special iron," the complainants contend that the rate is unreasonable in comparison with a specific rate of 15c. on boiler iron and steel plates from Cincinnati to Chattanooga and a rate of 17c. on plow steel. A rate of 12c. applies on bar iron and wrought iron or steel plate in the opposite direction; a rate of 15c. on architectural iron or steel and iron or steel rivets, and a rate of 13½c. on wrought-iron pipe.

The defendant carrier alleges that the rates on boiler iron, steel plates and plow steel were established approximately ten years ago to assist boiler and plow manufacturers in Chattanooga, but that other iron and steel articles suffer no hardship on account of these rates. The apparent disparity in the rates on the iron and steel articles in opposite directions between Cincinnati and Chattanooga the carrier explains on the ground that its policy has been to encourage traffic from points on its own line to points north of the Ohio River by establishing low northbound rates to enable Southern manufacturers to compete in the destination territory. These low northbound rates, moreover, are said to have been established for the benefit of certain of the complainants herein, and therefore are objected to as standards of comparison. Defendant also contends that the rate accords with the relative rate adjustment on "special iron" articles throughout the South. The rates on "special iron," including the articles in question, from Nashville, Tenn., Atlanta, Ga., Birmingham and Huntsville, Ala., to various points of destination in the South are from 3c. to 6c. higher than the rate attacked for similar distances. Many of the articles are manufactured at the points of origin just named except Huntsville. But complainants show that none of the points of destination named is a center for fabrication or manufacture of iron comparable to Chattanooga.

Considering all the facts in the case the commission holds that the rate complained of is unreasonable to the extent that it exceeds 19c. per 100 lb., minimum weight 36,000 lb. It is practically impossible, it says, to distinguish bridge plates from boiler plates, or bar iron and steel from plow steel. The maintenance of special commodity rates on bars, plates and slabs used in the manufacture of plows, for example, which in general are identical with and not distinguishable for transportation from merchantable

bars, plates and slabs sold to the general trade, suggests a possible discrimination and moves the commission to hold that a rate cannot be conditioned upon the use to which a commodity is to be put. The defendant carrier is therefore directed to remove from its tariffs all ambiguities by stating the rates specifically enough to avoid any possible discrimination.

W. L. C.

Acceptances in Iron and Steel Trade

At the twenty-first annual convention of the National Association of Credit Men, which met in Pittsburgh last week, the committee on iron, steel, hardware, electrical, farm implements and allied lines, composed of A. J. Gaehr, Cleveland, Ohio; M. A. Curran, New York City, and T. G. Connor, Youngstown, Ohio, voiced the opinion that trade acceptances offered one of the best forms of liquid commercial paper readily acceptable for rediscount by Federal reserve banks, not only as affording a desirable substitution for the open account system, but as a panacea for such ills as overextension through overbuying and overselling, the cash discount system, which offers untold opportunities for gross abuses by discount-grabbers, and again slow collections and deferred liquidation.

The conference held by the iron and steel and allied trades, including the electrical, was the largest attended trade conference of any at the convention, and much interest was shown in the question of trade acceptances in these trades. D. C. Wills, agent for the Federal Reserve Bank of the fourth district at Cleveland, Ohio, attended the conference in order that he could answer questions put to him by those present. There was lively interest shown in the matter, so much so that an adjournment was taken to a luncheon meeting on Friday, June 16, and even at that meeting the subject was not fully exhausted. A number of those present related their experiences in the matter of trade acceptances and stated they found them very satisfactory as far as they had gone. Many arguments were advanced in favor of trade acceptances, and there was no suggestion of any disadvantages. Finally it was decided to leave the matter largely to individual members. At the next convention of the Association of Credit Men the iron and steel and allied trades representatives will gather again and relate their experiences. In the meantime, a committee will be appointed to help over difficulties encountered. It will report at the next convention.

Electric Furnaces at Salt Lake City

The Utah Iron & Steel Company, Salt Lake City, Utah, is considering the installation of electric furnaces chiefly for converting the scrap material available in that district into soft steel which may be rolled in its mills at Middale near Salt Lake City. It is considering also the possibility of utilizing local ores for the manufacture of ferrotungsten and ferrochrome. It may install a furnace of as large as 12 or 15 tons capacity, and perhaps two of the furnaces. The interests controlling the Utah Iron & Steel Company also own the American Foundry & Machine Company, Salt Lake City, which is expanding its foundry business and in that connection is shortly to install a 3-ton Rennerfelt electric furnace, as already announced in THE IRON AGE. Low-cost electricity and an abundance of scrap material make the electric furnace an attractive proposition against local high cost of suitable coke and high cost pig iron.

Hawaii desires to be organized for industrial preparedness, judging from appeals made by business men and engineers who have written from Hawaii to the committee on industrial preparedness of the Naval Consulting Board of the United States. The industrial census by the committee has not yet been completed, but it reports a uniformly generous, broad attitude on the part of manufacturers, who emphasize mainly the need of our legislators providing for the so-called trial orders from time to time to keep the industries adjusted to the possible needs of war.

Munitions Equipment and the Government

Manufacturers Are Prepared to Undertake Home Orders, But Congress Shows Little Inclination to Rise to the Opportunity

WASHINGTON, D. C., June 20, 1916.—The completion by American manufacturers of foreign contracts for war munitions and the systematic dissemination of reports that henceforth the belligerent countries will be able to supply practically all their own demands have produced an interesting situation reflected in considerable correspondence now passing between manufacturers and the ordnance bureaus of the army and navy. The closing out of foreign orders is daily releasing more and more equipment specially designed for the manufacture of ordnance, ammunition and other war material and rendering valueless for practical purposes much engineering and mechanical skill that represents a heavy investment of both time and money. How to preserve this investment and turn it to account for the benefit of the United States Government is a problem that is engaging the thought not only of far-seeing manufacturers, but of the most experienced Government officials, and the answer would seem to be that Congress must act promptly or must shoulder the responsibility for an inestimable national loss.

The War and Navy departments have recently received communications from a number of large concerns which have about completed their foreign orders and which offer their equipment to the Government on various terms. Some state that unless they can receive orders for material they will be obliged to scrap their special equipment or so change it over as to render it unfit for the production of munitions. Others offer to carry their special tools for longer or shorter periods and to make up gages, dies, jigs, etc., for the production of United States standard arms and ammunition, provided the Government will furnish them with the necessary drawings and specifications and supervise their experimental work. The replies of the Government officials to these communications in the majority of cases have been unsatisfactory to the manufacturers, partly because of inherent difficulties in the situation and partly because the officials hesitate to make statements which might be construed as reflections upon the wisdom of Congress or as part of propaganda work in the interest of a different system of manufacturing and purchasing war material than that now authorized by law.

GOVERNMENT REPLIES TO MANUFACTURERS' PROPOSALS

Briefly summarizing the replies which the officials are making to propositions from manufacturers it is said: first, that the Government has absolutely no funds now at its disposal for the purchase of war material; second, that according to the present outlook only extremely modest sums for the purchase of material will be available during the coming year, and third, that if manufacturers, in spite of these discouraging conditions, desire to equip their plants for the production of United States standard articles and can give the necessary assurances that the data they may receive from the Government will not be utilized in the production of munitions for export, drawings, specifications and all necessary information will be gladly supplied.

That these replies are far from satisfactory is obvious and is freely admitted by the Government officials, but the responsibility for this extraordinary state of affairs rests solely with Congress, and if missionary work is done it should be directed to creating on the part of Senators and Representatives a more intelligent appreciation of the irreparable loss that will be suffered by the Government in default of legislation to enable the War and Navy departments to utilize the extraordinary equipment, unprecedented in the history of the world, which can be indefinitely maintained at a fraction of its real value to the country. The fact will be readily understood that the War Department,

for example, is unwilling to encourage a manufacturer to carry along a large investment in special equipment when there is every reason to believe that Congress will not change its present policy of requiring the arsenals to be run two full shifts, thus permitting the purchase, only occasionally, of small quantities of arms, ammunition and ordnance stores. It will also be understood that the officials, for obvious reasons, even if larger funds were available, would prefer to place orders with manufacturers whose resources would justify them in carrying along their special equipment with or without orders from the Government, instead of placing contracts with smaller concerns which must have Government business of a certain volume and regularity if their equipment is to be preserved.

"EDUCATIONAL" ORDERS

Just what confronts the War Department in this emergency, the gravity of which is in no way underestimated here—except by Congress, which is manifesting monumental ignorance and unfathomable stupidity in the matter—may be gathered from a brief summary of certain features of the Army appropriation bill, which, although not officially announced, have been practically agreed to. In providing an appropriation of \$2,500,000 for ordnance stores, ammunition, etc., the bill stipulates that only \$10,000 of this sum may be used in the purchase of ammunition. By a curious anomaly there is incorporated in the same provision of the bill a modification of the so-called Tilson amendment to the effect that \$250,000 of this appropriation may be used to procure gages, dies, jigs, tools, fixtures, etc., for the manufacture by the Government or by private parties of ammunition necessary for the use of the land forces of the United States in time of war. In advocating the adoption of the Tilson amendment the officials of the War Department have insisted that a liberal appropriation should be made for so-called "educational orders" to be placed with manufacturers to whom the Government may allot the special equipment proposed. Nevertheless, in this case the bill provides that only \$10,000 worth of material may be ordered from manufacturers in whose plants the Government shall have installed \$250,000 worth of special equipment in addition to what they have themselves provided.

PENNYWISE PROPOSALS

Another provision of the bill appropriates \$1,200,000 for small arms and ammunition for target practice, etc., but specifies that not more than \$50,000 "may be used for the purchase of articles not manufactured by the Government and necessary for small arms target practice." In this case not a dollar of this appropriation can be used to purchase small arms or ammunition unless it happens to be of a type not manufactured by the Government, which is a practically prohibitory stipulation. It is obvious also that if at any time the Government should need arms or ammunition, which it does not now manufacture, \$50,000 would be a totally inadequate sum to provide this requirement. Of an appropriation of \$3,000,000 for ordnance stores the bill stipulates that not more than \$100,000 may be used for the purchase of such stores and that of \$3,000,000 appropriated for field artillery not more than \$170,000 may be used for the purchase of guns, carriages, etc. It goes without saying that so small a sum as \$170,000 could not be judiciously spent for the purchase of field artillery, the units of which are relatively costly. In appropriating \$3,000,000 for ammunition for field artillery, the bill stipulates that not to exceed \$100,000 may be used to buy such ammunition under contract, but to this provision there is appended a paraphrase

of the Tilson amendment appropriating \$200,000 to procure gages, dies, jigs, tools, fixtures, etc., for the manufacture by the Government or by private manufacturers of field artillery and ammunition.

In securing the adoption of the so-called Tilson amendment in various forms to both the Army and Fortifications bills, the War Department officials feel that they have taken a long step in the right direction; but the practical success of this project for equipping private plants to co-operate with the Government in an emergency must depend upon the granting by Congress of sufficient appropriations to permit the placing of educational orders from time to time with all establishments which receive the special equipment. The allotments for these orders available from the appropriations carried by the Army and Fortifications bills as framed by the House, are wholly inadequate. Will the Senate come to the rescue? This question is deeply concerning the officials and should also interest all manufacturers who desire to assist the Government at this time. Frank statements addressed to Senators and Representatives, describing the situation as it now exists and pointing to the importance of prompt and liberal action by Congress, cannot fail to be helpful in securing the necessary modification of the pending budget measures.

W. L. C.

Features of a Shell Contract

The Harrisburg Pipe & Pipe Bending Company, Harrisburg, Pa., has finished its contract for 600,000 high explosive shells with the British Government. The company was advised that it was one of only three contractors for projectiles that had kept their promises of delivery and had fully met the requirements for quality. It was offered a contract for a larger size of projectiles, for its entire output to Oct. 31, 1916, which W. T. Hildrup, Jr., general manager, states he declined for the following reasons:

In view of the almost certain imposition by our own Government of a tax on munitions, and also considering the very heavy expense involved in equipping our machinery for the larger size, the price offered we considered inadequate to protect us against actual loss, had we undertaken the contract.

The company will now devote its full attention to the domestic trade, marketing its product of steel in the form of billets, universal plates, stamping strips and special steels, for all of which products there is a good demand at the present time. Its munitions plant, however, will be retained for the possible use of the United States Government.

Mr. Hildrup further states that the company established a new high record for making projectiles per man and per lathe for either England or the United States. It became necessary to stimulate production the past few weeks to the highest attainable point in order that the contract should be completed by June 30, as any unfilled portion was to be automatically canceled if not completed by that time. Large bonuses on all shells made over a certain number were given to the workmen with this in view. The men produced 50 per cent more shells than the company had thought possible from its equipment, but it stood by its agreement, although the bonuses paid were excessive, as they were only operative for a short time. The pay of one worker for one week, with his bonus, amounted to \$152 and a number of others made nearly \$100 a week.

Armstrong Whitworth of Canada, Ltd., of which M. J. Butler is managing director, has awarded a contract for doubling its plant at Longueuil, Que. The floor space will be increased from 50,000 to 100,000 sq. ft. The addition will be of steel and concrete and will include units to manufacture steel tires for locomotives, etc., rolling steel wheels, manufacture of forged axles, etc. A rolling mill will be installed, with provision for making special rounds and shapes of electrically converted steel. The Dominion Bridge Company, Montreal, has received the contract for the steel required and the machinery will be furnished by the Morgan Engineering Company, Alliance, Ohio.

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Book Reviews

Metallography of Steel and Cast Iron. By Henry Marion Howe, professor emeritus of metallurgy in Columbia University. Pages, 641, 7x10 in.; with 45 plates showing 339 micrographs, also 13 folding insert tables and charts. Published by McGraw-Hill Book Company, Inc., New York. Price, \$10.

It had been known for some time that Professor Howe was working on a new edition of his famous "Metallurgy of Steel." The present volume is to be followed by others, so that it may be considered as the first instalment of the long-expected new edition. The title is a little misleading, for many other things than metallography are dealt with; in other words, the book will appeal to a far wider circle of readers than those engaged or chiefly interested in metallography. The first two chapters are introductory, No. 1 being historical. It does not cover the history of metallography, but in a brief and interesting way the history of the iron and steel industry. Chapter 2 is a reprint of Professor Howe's article in the *Atlantic Monthly* of June, 1910, on the "Permanence of Our Supply of Iron." This article was widely read and commented on at the time. It was written in the spirit of scientific prophecy, and points out that when all other resources fail some method will be found to tap the core of the earth, known to be rich in iron.

Methods of iron and steel manufacture are outlined in Chapter 3, and a very thorough discussion of nomenclature is given in Chapter 4, which is most interesting and naturally of importance to all makers and users of iron and steel. Many of its ideas cannot be properly discussed in a review, but it may be pointed out that hyper-eutectoid is not a term used in present industrial nomenclature when speaking of high carbon steel, although well understood by scientific workers. The comparison of terms in different languages and the definitions of terms as given in the later part of this chapter are very valuable.

Chapters 5 and 6 take up in considerable detail the constitution of iron. Wrought iron, steel and cast iron are dealt with, and very properly, as one series of alloys. These chapters are highly interesting and the diagrams admirable. The detailed comparison with igneous rocks in Chapter 5 is particularly good, and foundrymen will find very instructive the three tables given at the end of the same chapter on the kinds of cast iron to use for various purposes.

The next four chapters deal with the carbon-iron diagram, which is particularly important to all interested in the heat treatment of steel. Chapter 7 is introductory, taking up the Sodium-Nitrate-Water Diagram. The two succeeding chapters consider in great detail the parts of the diagram covering steel, and Chapter 10 the transformations in cast iron. This chapter is succeeded by one on graphitization, or the conditions surrounding the formation of graphite, a matter of importance to all interested in cast iron and malleable iron.

Chapter 12 deals with the Phase Rule in plain, simple language. It is an excellent discussion of this difficult subject, particularly in showing the limitations of the application of this law to iron and steel alloys.

Chapters 13 and 14 review at length the evidence that the structure of metals is crystalline, and with these chapters opens what may be called the second part of the book, dealing with the little known subject of plastic deformation. It is more theoretical than the part so far considered, also it is not at present of direct practical application, because the laws underlying the subjects it treats are at present unknown. There is no question, however, of the importance of the matter, and Professor Howe is to be commended for having brought together and discussed so fully all that is now known about it. The titles of the chapters are:

Deformation in General	Neumann Bands or Mechanical Twins in Ferrite
Specific Deformation	
Silhouettes or Compression	Mechanism of Twinning
Slip Bands	The X-Bands
Bailey's Amorphous Theory	Deformation Lines in Hadfield's Austenitic Manganese Steel
Plastic Deformation in Steel	
Twins	

Then follow four chapters on fracture, namely, on Fluid and Crystalline Motion in Metals, Inter-Granular and

Trans-Crystalline Rupture, Relative Preference of the Path of Rupture for Ferrite and Pearlite, and Fracture. This last is particularly good, as it contains a detailed discussion of Brinell's little-known work on fractures, carried out in 1884 and 1885.

The last two chapters are on Ghosts and the Other Elements of Fiber and Influence of Manufacturing Conditions on Fiber. They are of direct interest to all makers of plate and wrought iron, the latter chapter containing a good discussion of the relative merits of direct and indirect rolling of plates from ingots. The book closes with three appendices, one on crystallography, another containing details of the iron and steel worked on in the experiments described in the book and also many useful tables, and the third giving notes to the text and the index.

This brief outline has but indicated the ground covered. More could not well be attempted, so stupendous is the book in the amount of labor and thought expended in its making. As in all Professor Howe's papers and books, the language is clear and forceful, and while many of the subjects treated are theoretical, the practical man will find very many chapters and sections of direct interest to him. From the scientific standpoint the book is noteworthy. Every chapter represents the profound thought of the author—the gathering up of the experience gained in many years of consulting practice, research work, teaching, and the careful consideration of results obtained by other workers. In many ways, as in the detailed study of the phenomena of deformation, it is written for the workers of the future as much as for those of to-day. But from whatever standpoint it is considered it is worthy of its distinguished author and the eminent French savant, Henri Le Chatelier, to whom it is dedicated.

G. B. W.

The Metallurgy of Steel. By F. W. Harbord and J. W. Hall. Fifth edition, two volumes. Pages, 932, 6 1/2 x 9 in. Published by Charles Griffin & Co., London, England, and J. B. Lippincott Company, Philadelphia, Pa. Price, \$12.50.

The fifth edition of this important English work has just appeared. It has long been one of the standard authorities on steel metallurgy and this improved edition enhances its value. The important advances in the industry have been dealt with and these constitute the principal change from the original.

A short chapter is devoted to the production of pure iron in the basic open-hearth furnace. The Hadfield and Talbot methods for producing sound steel ingots and for decreasing segregation are discussed while the chapter on armor plate manufacture has been largely rewritten. The chapter devoted to the theory of the hardening of steel has also been recast and its value has been augmented by a short summary of the various new stress theories by Professor Carpenter with his comments.

The second volume is devoted as usual to the "Mechanical Treatment of Steel" by J. W. Hall.

Since plastic flow is of such great importance in metallurgy, ceramics, road building, lime, cement, etc., the Bureau of Standards, Washington, D. C., conducted an investigation into the laws of plastic flow, with some interesting results, as given in Scientific Paper No. 218, "An Investigation of the Laws of Plastic Flow." The investigations included a careful study of the theory of each type of viscous and plastic flow, the experiments making it possible to distinguish sharply between the two kinds of flow.

"The Strength and Stiffness of Steel Under Biaxial Loading," by Albert J. Becker, is the title of Bulletin No. 85 issued by the Engineering Experiment Station of the University of Illinois. The purpose of the investigation was to determine the laws governing the strength and stiffness of mild steel when subjected to combined stress produced by two tensions at right angles to each other or by a compression combined with a tension at right angles.

Status of Stevens Bill

WASHINGTON, D. C., June 20, 1916.—Convinced that the advocates of the price maintenance principle, as exemplified in the so-called Stevens bill now pending before the House Committee on Interstate and Foreign Commerce, have sufficient strength to enact this measure into law if it can be brought to a vote, the opponents of price fixing have organized a campaign designed to prevent a ballot at the present session. After two days devoted to hearing the champions of price maintenance the committee suspended its session and gave notice that the opponents of the bill would be heard "after the Presidential conventions" and it was further stated that the friends of the bill would be permitted to close the discussion after the opponents had completed their arguments.

The object behind this apparently liberal arrangement for hearings has now been disclosed. Chairman Adamson, who has regulated the procedure before the committee, is strongly opposed to any form of price fixing and for more than two years has prevented action on the Stevens bill. Within the past few weeks the demand on the part of members of the House for an opportunity for recording themselves in favor of price maintenance has come to be so strong that threats have openly been made that unless the committee would permit the bill to come to a vote a motion would be made on the floor to discharge it from the further consideration of the measure. To escape the humiliation of defeat on the floor the opponents of the bill in committee agreed to give hearings.

It is now stated that because of the press of other important legislation it will probably not be practicable to hear the opponents of price fixing for a week or two, and that another week or two may elapse thereafter before the champions of the bill present their concluding arguments. If this program is carried through, Congress will be on the eve of adjournment before the hearings are completed. Some time will then elapse for the editing and printing of the record.

The friends of the bill in Congress, however, are prepared to take drastic measures. The rapidly increasing popularity of price maintenance, especially among the rank and file of the voters of the country, renders the Stevens bill a very attractive proposition from a political standpoint and many members of both houses are determined that an opportunity shall be afforded of going on the record before the elections. So strong is this sentiment that it is believed the House leaders will hesitate to assume responsibility for preventing a vote. Under the circumstances there is every reason to look for a battle royal over price maintenance before adjournment, with chances largely in favor of the passage of the bill if it can be brought to a vote.

Some ingeniously conceived work against this bill is being done in the apparent interest of a similar measure recently introduced in the Senate by Senator Borah of Idaho. Letters and telegrams are reaching both House and Senate in considerable numbers urging the passage of the Borah bill. The fundamental difference between the two bills is that the Stevens measure legalizes the maintenance of prices fixed by the manufacturers of identified merchandise, while Senator Borah's proposition is that the Federal Trade Commission shall determine all retail prices protected by law. Of course, the champions of the Stevens bill are strongly opposed to the Borah measure.

W. L. C.

Ferromanganese Imports Increasing

Official Government reports furnished THE IRON AGE show ferromanganese imports in May to have been 8466 gross tons. This is the largest month this year and compares with an average of 6474 tons per month to May 1, 1916. The May imports were received as follows: 6195 tons through Baltimore, 1198 tons through Philadelphia and 1073 tons through New Orleans.

The records of the Bridge Builders' & Structural Society, as collected by its secretary, George E. Gifford, show that in the month of May 80 per cent of the entire capacity of the bridge and structural shops of the country was put under contract.

LIFE OF STEEL FREIGHT CARS

Results Not as Good as Predicted—Methods of Prolonging Effective Service

Steel freight cars have had a considerably shorter life than was originally expected, writes M. K. Barnum in the *Railway Age Gazette*, discussing the "Life and Maintenance of All-Steel Cars." When the first steel cars were built, he says, their advocates claimed that they would be practically indestructible and their life so much longer than that of wooden cars that it would be very difficult to estimate it. Later when they came into use, estimates of their life were placed at 25 to 35 years and the rate of depreciation was put at 3 per cent per year as against 6 per cent for wooden cars. There has been considerable difference in their durability, according to how they are maintained, where they are used and the character of loading.

The oldest steel freight car now in use was built in 1896. The frame was made of structural shapes and it weighed nearly 42,000 lb. or about 4000 to 5000 lb. more than many cars of the same capacity built later. Its design compares favorably with the latest. It has been kept well painted. Some of the doors and hoppers required new sheets at the end of 9 years, and after 14 or 15 years the floor sheets required extensive renewals and the side sheets and stakes some repairs. At 18 years it had a new floor, 8 new hopper sheets and other repairs, and its appearance indicates that it may last 10 years more. However, it is apparently an exception.

After discussing many of the conditions and problems relating to steel cars and giving valuable suggestions as to repairs, and mentioning corrosion as the most active agent of destruction, the author offers the following conclusions:

The average age of steel gondola and hopper cars will probably be about sixteen years, judging by the records of those cars which have already reached their limit of life.

The depreciation of steel gondola and hopper cars should be calculated at about 5 per cent.

It will pay to keep steel cars well painted on account of preserving their strength and improving their appearance and extending their life.

Commenting on the paper, the *Railway Age Gazette* says that a fair estimate places the all-steel cars in service at the close of 1915 at 530,000 and that on June 30, 1915, there were also 672,121 freight cars of steel under-frame construction, which, with the cars of all-steel construction, constitute over 50 per cent of the freight car equipment of the roads of the country. It is added that the cost of repairs has increased from \$61 per car per year in 1908 to \$80 in 1914, and a careful study of the general question of freight car repairs shows that the steel car has been responsible for a part of this increase. The open steel freight cars, which comprise over 81 per cent of the all-steel equipment in use, present the greatest field for investigation.

It is urged that the cars must be protected from corrosion and that the parts subjected to the severest strain be so constructed as to be readily removed. The case of steel bridges and locomotive tenders, made to last 25 to 50 years by proper protection with paint, is cited. Steel cars will produce even greater returns if they are cared for properly.

Since the publication of the article by Mr. Barnum, it was brought out at the Atlantic City convention of the Master Car Builders that the Pennsylvania Lines are now making heavy repairs to cars that have already been in service 18 years, and judging from the present condition of the cars their life will probably reach to about 30 years. It was stated that that system now has in service 130,000 all-steel cars, the first of which were built in 1898 and that of this total 97 cars have been destroyed on foreign lines. The *Railway Age Gazette* says that this certainly bears out the contention that the steel car must be designed and built along different lines from the old wooden car if satisfactory service is to be obtained, and that ample strength should be provided even at the expense of some increase in weight. If the railroads are to get the maximum life from any steel car it must be well and frequently protected with a good quality of paint.

Iron and Steel Markets

MORE PROMPT MATERIAL

Prices Also Easier on Bessemer Products

Government Navy Program Represents 150,000 Tons—Pig-Iron Sales to Italy

The steel trade is quieter, but the quietness is not undermining prices. Only recently competitive bidding of foreign and domestic buyers was forcing prices up steadily; now the stage is reached when new export demand is of more consequence than that at home.

The fact that more steel in certain forms is available for early shipment is attracting attention. There is some re-selling of structural steel by fabricators who bought speculatively in part. Added to this are offerings of Bessemer bars and shapes at 2.50c. Pittsburgh, for early delivery, and the marketing of considerable quantities of rejected munition steel in the form of ingots, billets and bars. At the same time the falling off in new inquiry has restricted the market for steel at premium prices.

These minor developments leave the main situation unchanged in its outlook for full operation for many months. Of most interest in the next few months will be the gradual approach of contract and prompt delivery prices.

Some new contracts for war forgings have been made including 100,000 9.2-in. and 10,000 12-in. shells, representing together about 24,000 tons of steel. Some of the smaller munitions contracts are running out and more are to be placed at lower prices, but the bulk of the steel for such work has been covered for this year.

If Bessemer steel is taken, the early deliveries wanted on the second half of the 350,000 tons of rails Russia set out to buy can be had. Some stiff prices were realized on the part of this business already placed. By another week the full extent of Russia's large barb wire orders will probably be known.

There is some interest in offerings of Bessemer universal plates at 2.75c. to 3c. for delivery in 60 days, but for open-hearth plates for such delivery 3.50c. appears to be the minimum, with 4c. still commonly asked. The plate mills are counting much on the effect of the naval program for the coming year. If two dreadnaughts are included, as now indicated, a total of 150,000 tons of plates and shapes would be required and most of it would probably be bought in the next six months. A new Japanese inquiry is for 10,000 tons of plates.

The deadlock between implement makers and bar mills over contracts for the first half of 1917 is still on. Of no little concern to smaller implement companies is the very conservative attitude of their larger competitors toward advances on their products.

In the pig-iron market interest still centers in Italy's buying of Bessemer iron. An eastern Pennsylvania furnace company has taken 30,000 tons and a Mahoning Valley producer 10,000 tons. For early shipment as high as \$21.50 at Valley furnace has been paid for export Bessemer iron. At Pittsburgh a large steel interest recently bought 40,000 tons of basic iron at close to \$18. Another 10,000-ton sale was made and a 10,000-ton inquiry is up.

Southern resale pig iron continues to depress that market. To avoid July storage charges and interest, holders of warrants are making attractive offers, some of them below \$13.50. Furnaces have sold at \$14.50 for second half and that price has been named on first half business. Consumers are little interested in forward contracts. Buying of 25,000 tons of foundry iron by three Eastern interests brought out concessions and Buffalo resale iron of 1.75 silicon went below \$17.50 at furnace.

The Mesaba range iron miners' strike looks worse, but on the question of ability to get down enough Lake ore there have been exaggerated scare reports. Record shipments are being made and alarm is at least premature.

Extreme weakness in heavy melting steel and some other materials is disconcerting to the scrap trade and has had its effect on pig iron.

The week's declines in metal prices have been general and some of them marked.

Pittsburgh

PITTSBURGH, PA., June 20, 1916.

Consumers are only buying such quantities of steel as they actually need. As the mills are sold up on practically everything they make into fourth quarter, and on some lines through the entire year, the falling off in buying is not causing any great anxiety but is rather welcome, as it will give them a chance to catch up to some extent on obligations. It is believed that a considerable gain has been made this month in shipments over contracts, this being a change in the conditions prevailing for months. The falling off in domestic inquiries is more than made up by the increase in export demand, notably for pig iron, semi-finished steel, tin plate, wire and other products. There is also a large export demand for locomotives, steel rails, plates and other heavy forms of material. The mills say that any decline in business from domestic consumers can quickly be replaced with foreign orders if they care to take them. Prices are firm on all lines, and the reported weakness in Bessemer steel bars is incorrect, so far as this district is concerned. The leading makers of steel bars are quoting the same prices now that they have been asking for some months. The shortage in labor is getting more acute, due partly to the warm weather and partly to the fact that skilled men are now getting very high wages. In some cases, notably in sheet and tin-plate mills, the men are laying off a day or two each week and yet are earning as much money as they made working a full week a year ago. A shortage of labor in the coke regions is helping to keep down output. Some large inquiries for blast-furnace coke are

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics
At date, one week, one month, and one year previous

June 21, June 14, May 24, June 23,				
Pig Iron, Per Gross Ton:	1916.	1916.	1916.	1915.
No. 2 X, Philadelphia...	\$19.75	\$20.00	\$20.50	\$14.25
No. 2, Valley furnace...	18.25	18.00	18.00	12.50
No. 2 Southern, Cin'ti...	17.40	17.40	17.90	12.65
No. 2, Birmingham, Ala.	14.50	14.50	15.00	9.75
No. 2, furnace, Chicago*	19.00	19.00	19.00	13.00
Basic, del'd, eastern Pa.	19.50	19.75	20.50	13.75
Basic, Valley furnace...	18.00	18.00	18.00	12.65
Bessemer, Pittsburgh...	21.95	21.95	21.95	14.70
Malleable Bess., Ch'go*	19.50	19.50	19.50	13.00
Gray forge, Pittsburgh...	18.70	18.70	18.70	13.35
L. S. charcoal, Chicago...	19.75	19.75	19.75	15.75

Billets, etc., Per Gross Ton:

Bess. billets, Pittsburgh...	42.00	45.00	45.00	21.00
O-h. billets, Pittsburgh...	42.00	40.00	42.00	21.00
O-h. sheet bars, P'gh...	42.00	40.00	42.00	22.00
Forging billets, base, P'gh.	69.00	69.00	69.00	27.00
O-h. billets, Phila...	50.00	50.00	50.00	22.02
Wire rods, Pittsburgh...	55.00	55.00	60.00	25.00

Finished Iron and Steel,

Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Bess. rails, heavy, at mill	1.47 1/2	1.47 1/2	1.47 1/2	1.25
O-h. rails, heavy, at mill	1.56 1/2	1.56 1/2	1.56 1/2	1.34
Iron bars, Philadelphia...	2.65	2.65	2.65	1.22 1/2
Iron bars, Pittsburgh...	2.50	2.60	2.60	1.25
Iron bars, Chicago...	2.35	2.35	2.35	1.20
Steel bars, Pittsburgh...	2.75	2.75	3.00	1.20
Steel bars, New York...	2.919	2.919	3.169	1.369
Tank plates, Pittsburgh...	3.75	3.75	3.75	1.15
Tank plates, New York...	3.919	3.919	3.919	1.319
Beams, etc., Pittsburgh...	2.50	2.50	2.60	1.20
Beams, etc., New York...	2.669	2.669	2.769	1.369
Skelp, grooved steel, P'gh	2.35	2.35	2.35	1.15
Skelp, sheared steel, P'gh	2.45	2.45	2.45	1.20
Steel hoops, Pittsburgh...	2.75	2.75	2.75	1.30

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

in the market for last half of the year. The scrap market is neglected, with prices somewhat demoralized.

Pig Iron.—A leading interest recently bought 40,000 tons of basic iron for delivery over the next three or four months at a price equal to \$18 or more at Valley furnace. Export inquiry for Bessemer iron is heavy. A Mahoning Valley furnace interest has just sold 10,000 tons of Bessemer for fairly prompt shipment to Italy at \$21.50 at Valley furnace. Another inquiry is in the market for 20,000 tons of Bessemer, presumably for Italy, through Eastern brokers. A consumer in the Shenango Valley bought recently 10,000 tons of basic iron for delivery over the last half at \$18, Valley furnace, and the Colonial Steel Company of this city has an inquiry out for 10,000 tons of basic for the same delivery. The demand for foundry iron is no better, but prices are fairly firm, most sellers asking \$18.25 and some \$18.50 at furnace. We quote Bessemer iron at \$21; basic, \$18; gray forge, \$17.75 to \$18; No. 2 foundry, \$18.25 to \$18.50, and malleable Bessemer, \$18.50 to \$19, all at Valley furnace, the freight rate to the Pittsburgh or Cleveland district being 95c. per gross ton.

Ferroalloys.—New inquiry for ferromanganese for prompt shipment is quiet, consumers evidently having covered their needs for some time ahead. Prices seem to be easier and domestic 80 per cent ferromanganese ranges from \$225 to \$250 in small lots, f.o.b. at maker's furnace. It is said that some contracts for domestic 80 per cent ferromanganese have been made for last half of the year and first half of next year at \$200 or less at furnace. The price of English 80 per cent on contracts remains at \$175, seaboard, but with no guarantee as to deliveries. We quote 18 to 22 per cent spiegel-eisen at \$50 to \$55, and 25 to 35 per cent at \$55 to \$60 at furnace. We quote 50 per cent ferrosilicon at \$85 for lots up to 100 tons; over 100 tons and up to 600 tons, \$84, and over 600 tons, \$83, all per gross ton, f.o.b. Pittsburgh. Prices of Bessemer ferrosilicon for delivery over remainder of the year are now quoted as follows: 9 per cent, \$32; 10 per cent, \$33; 11 per cent, \$34; 12 per cent, \$35; 13 per cent, \$36.50; 14 per cent, \$38.50; 15 per cent, \$40.50, and 16 per cent, \$43. Seven per cent silvery for the same delivery is \$28.50; 8 per

June 21, June 14, May 24, June 23,				
Sheets, Nails and Wire,	1916.	1916.	1916.	1915.
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Sheets, black, No. 28, P'gh	2.90	2.90	2.90	1.75
Galv. sheets, No. 28, P'gh	4.60	4.75	4.75	5.00
Wire nails, Pittsburgh...	2.50	2.50	2.50	1.55
Cut nails, Pittsburgh...	2.60	2.60	2.60	1.55
Fence wire, base, P'gh...	2.45	2.45	2.45	1.35
Barb wire, galv., P'gh...	3.35	3.35	3.35	2.40

Old Material, Per Gross Ton:

Iron rails, Chicago...	18.00	18.00	18.00	12.25
Iron rails, Philadelphia...	20.00	20.00	20.00	15.00
Carwheels, Chicago...	12.25	12.75	13.00	10.50
Carwheels, Philadelphia...	16.50	16.50	16.50	11.50
Heavy steel scrap, P'gh	15.75	16.00	16.75	11.75
Heavy steel scrap, Phila.	15.00	15.50	16.00	11.25
Heavy steel scrap, Ch'go	14.50	14.75	15.75	9.50
No. 1 cast, Pittsburgh...	15.75	16.00	16.00	12.25
No. 1 cast, Philadelphia...	16.00	16.50	17.50	12.25
No. 1 cast, Ch'go (net ton)	11.50	11.75	12.50	9.00

Coke, Connellsville, Per Net Ton at Oven:

Furnace coke, prompt...	\$2.40	\$2.40	\$2.25	\$1.60
Furnace coke, future...	2.50	2.50	2.50	1.75
Foundry coke, prompt...	3.25	3.25	3.00	2.00
Foundry coke, future...	3.50	3.50	3.25	2.25

Metals,

Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York...	27.75	28.00	29.00	22.50
Electrolytic copper, N. Y.	27.00	27.75	28.50	20.00
Spelter, St. Louis...	12.25	13.25	14.75	17.50
Spelter, New York...	12.50	13.50	15.00	18.00
Lead, St. Louis...	6.45	6.70	7.25	5.35
Lead, New York...	6.62 1/2	6.85	7.45	5.75
Tin, New York...	40.75	43.25	48.00	41.25
Antimony, Asiatic, N. Y.	18.00	20.00	28.00	37.00
Tin plate, 100-lb box, P'gh	\$5.75	\$5.75	\$5.50	\$3.10

cent, \$29; 9 per cent, \$29.50; 10 per cent, \$30; 11 per cent, \$31, and 12 per cent, \$32. All these prices are f.o.b. at furnace, Jackson or New Straitsville, Ohio, or Ashland, Ky., each of these points having a freight rate of \$2 per gross ton to Pittsburgh.

Billets and Sheet Bars.—Export inquiry is heavy for soft Bessemer and open-hearth semi-finished steel and some contracts have been placed. It is said that some consumers of sheet bars will pay close to \$40 for third quarter delivery. Owing to the increased export inquiry for open-hearth steel, the recent softness in prices seems to have disappeared to some extent, and \$42 on open-hearth billets and sheet bars is claimed to be the minimum of the market. It is possible that Bessemer steel could be obtained at about \$40 at mill. We note a sale of 100 tons of high-carbon forging billets at about \$70, Pittsburgh. We now quote soft open-hearth billets and sheet bars at \$42 to \$45; Bessemer billets, \$40 to \$42; and Bessemer sheet bars, \$40 to \$42, maker's mill, Pittsburgh or Youngstown district. We quote forging billets at \$69 for sizes up to but not including 10 x 10 in., and for carbons up to 0.25, the regular extras being charged for larger sizes and higher carbons. Forging billets running above 0.25 and up to 0.60 carbon take \$1 extra.

Steel Rails.—It is understood that the local interest will roll about half of the order for 175,000 tons of 67 1/2-lb. rails recently placed by Russia in this country. There is little new demand for standard sections and the demand for light rails has quieted down to some extent. The lumber and coal-mining interests are buying light rails quite freely, but the traction companies are doing very little. We quote light rails as follows: 25 to 45 lb. sections, 2.10c.; 16 and 20 lb., 2.15c.; 12 and 14 lb., 2.20c., and 8 and 10 lb., 2.25c., in carloads and up to 100 tons. An advance of 5c. per 100 lb. is charged for less than carloads and down to 3 tons, while under 3 tons an additional 5c. is charged. We quote standard section rails of Bessemer stock at 1.47 1/2c., and open-hearth steel, 1.56 1/2c., Pittsburgh.

Plates.—The demand for sheared plates is enormously heavy, but for universal plates is only fair. The Baltimore & Ohio Railroad is reported to be in the market for 1000 steel hopper cars. The Pressed

Steel Car Company has enough orders on its books to run up to August, but very little beyond that month. Prices on plates, especially for prompt shipment, have eased off to some extent. The mill price on $\frac{3}{4}$ -in. and heavier steel plates is 2.75c. for delivery in last quarter of 1916 and first quarter of 1917. For shipment in six to eight weeks mills quote 3.50c. to 4c., and sales are being made at these prices. Two of the leading plate mills are sold out for this year and are taking orders for first quarter of next year at 2.75c. at mill.

Structural Material.—The inquiry in the past week was more active. The American Bridge Company has taken 4000 tons for a steel bridge for the Pennsylvania Lines West, across the Beaver River at Rochester, Pa., and has also taken 70 steel barges for the Carnegie Steel Company, about 12,000 tons, to be used in hauling coal from Carnegie mines to Clairton, Pa., for use in by-product coke ovens now being built. An inquiry is out for about 1000 tons of steel for an addition to the Mercy Hospital in this city. The Jones & Laughlin Steel Company will furnish about 3000 tons of steel for new buildings for the Revere Sugar Company, Boston, Mass. A local interest has taken 2100 tons for a viaduct at Pottstown, Pa., also 1400 tons of bridge work and another interest is reported to have taken 1200 tons for a shipbuilding plant at Chester, Pa. The Virginia Bridge & Iron Company has taken 400 to 500 tons for a sugar mill in Cuba. We quote beams and channels up to 15 in. at 2.50c. to 2.75c. at mill for delivery in third and fourth quarters, while small lots from stock are held at 3.25c. up to 4c., prices depending entirely on the size of the order and how soon deliveries are wanted.

Sheets.—There is only a fair demand, the trade being largely covered for the remainder of this year, especially on blue annealed, electrical and deep stamping sheets. The lower prices on spelter are responsible for a decline in prices of galvanized sheets, which have sold as low as 4.60c. at mill for No. 28, but the leading interest is holding its price on galvanized sheets at 5c. minimum. The Pennsylvania Railroad has an inquiry out for 1000 to 1200 tons of blue annealed sheets for cars it will build at its Altoona shops. There is a shortage of skilled labor in sheet mills, which is holding down output to some extent, but deliveries of steel are nearly normal. We quote blue annealed sheets, Nos. 9 and 10, at 3c. to 3.25c. for delivery at convenience of the mill; but it is stated some Eastern mills have sold blue annealed as high as 3.75c. at mill for fairly prompt delivery. We quote No. 28 Bessemer and open-hearth black sheets at 2.90c. to 3c.; No. 28 galvanized, Bessemer and open-hearth, 4.60c. to 4.75c.; Nos. 22 and 24 black plate, tin mill sizes, H. R. & A., 2.90c.; Nos. 25, 26 and 27, 3c. to 3.10c.; No. 28, 3.10c. to 3.15c., and No. 29, 3.20c. to 3.25c. These prices are for carloads and larger lots, f.o.b. mill, Pittsburgh.

Tin Plate.—New inquiry is fairly heavy, some large consumers being in the market for more tin plate for delivery late in the year, but, with the present congested condition of orders, they may have trouble in finding a supply. From stock primes are selling at \$6 and wasters at \$5.75 per base box for prompt shipment. The export inquiry is fairly heavy, but local mills have their output sold up for this year and are not actively quoting on such business. Some inquiry has come in the market recently for tin plate for delivery early in 1917, but the mills are refusing to quote that far ahead. We quote from stock at \$5.75 to \$6, and for export \$6.25 to \$6.50, per base box at mill. Prices on terne plate are firm, and we quote 8-lb. coated ternes at \$8.50 to \$8.75 for 200 lb. and \$8.75 to \$9 for 214 lb., all f.o.b. at maker's mill.

Skelp.—Mills are sold up for three or four months ahead, and prices are very strong. We quote grooved steel skelp at 2.35c. to 2.40c.; sheared steel skelp, 2.45c. to 2.50c.; grooved iron skelp, 2.70c. to 2.80c., and sheared iron skelp, 3c. to 3.10c., all delivered to consumers' mills in the Pittsburgh district.

Cold-Rolled Strip Steel.—Nearly all consumers are covered through third quarter and remainder of the

year, but a few contracts are still being placed, and we note sales of 600 to 800 tons for delivery in last quarter at \$6 per 100 lb. base. On small lots makers are quoting from \$6.50 to \$7. Some of the larger makers are practically sold out for this year. Extras, standard with all the mills, were printed in full on page 810 of THE IRON AGE of March 30.

Railroad Spikes.—The entire order of the Boston & Maine Railroad for 10,000 kegs of standard spikes for delivery late this year was placed with a local maker. Regular prices, which have been shaded in some cases, are as follows:

Standard railroad spikes, $4\frac{1}{2}$ x $9/16$ in. and larger, \$2.65 to \$2.75; railroad spikes, $\frac{1}{2}$ and $7/16$ in., \$2.75 base; railroad spikes, $\frac{3}{8}$ in. and $5/16$ in., \$3.05 base; boat spikes, \$2.80 base, all per 100 lb. f.o.b. Pittsburgh.

Nuts and Bolts.—Domestic and export demand is still fairly heavy, but most domestic consumers are covered over the remainder of the year and are specifying very freely against their orders. Makers of nuts and bolts are turning out a larger product than ever before, but are still back in shipments 8 to 10 weeks or longer. Discounts in effect from May 19, which the makers state are for prompt acceptance only, are as follows, delivered in lots of 300 lb. or more where the actual freight rate does not exceed 20c. per 100 lb., terms 30 days net, or 1 per cent for cash in 10 days:

Carriage bolts, small, rolled thread, 50 and 10 per cent; small, cut thread, 50; large, 40.

Machine bolts, h.p. nuts, small, rolled thread, 50, 10 and 5 per cent; small, cut thread, 50 and 5; large, 40 and 10.

Machine bolts, c.p.c. and t. nuts, small, 40, 10 and 5 per cent; large, 35 and 5.

Blank bolts, 40 and 10 per cent; bolt ends, with h.p. nuts, 40 and 10; with c.p. nuts, 35 and 5. Rough stud bolts, 15. Lag screws (cone or gimlet point), 50 and 10.

Forged set screws and tap bolts, 10 per cent. Cut and round point set screws, case hardened, 60. Square and hexagon head cap screws, 55. Flat, button, round or fillister head cap screws, 30.

Nuts, h.p. sq. tapped or blank, \$2.90 off list; hex., \$2.90 off; c.p.c. and t. sq. tapped or blank, \$2.60 off; hex., \$3 off; semi-finished hex., 60 and 10 per cent; finished and case hardened, 60 and 10.

Rivets, $7/16$ in. in diameter and smaller, 45, 10 and 10 per cent.

Wire Rods.—The market has quieted down, new demand being less active as consumers are covered largely for remainder of the year. We note several sales of high carbon rods at about \$67, maker's mill. There is a wide range in prices on soft Bessemer and open-hearth rods, being quoted as low as \$50 and up to \$65 in small lots for prompt shipment. We quote soft Bessemer, open-hearth and chain rods from \$55 to \$60 per ton, Pittsburgh, but possibly \$50 could be done by a regular customer from his own source of supply.

Wire Products.—The usual summer dullness has settled down on the wire trade, new demand for wire nails being only fairly active. Consumers are largely covered through the third quarter and specifications against contracts are active. The makers of wire and nails have their entire output pretty well under contract for the remainder of this year. There is nothing in sight that would indicate an early advance. Regular prices in effect from May 1 are as follows: Wire nails, \$2.50 to \$2.60 per keg; galvanized, 1 in. and longer, taking an advance over this price of \$2, and shorter than 1 in., \$2.50. Plain annealed wire, \$2.45 per 100 lb.; galvanized wire, \$3.15; galvanized barb wire and fence staples, \$3.35; painted barb wire, \$2.65; polished fence staples, \$2.65; cement coated nails, \$2.50, base, all f.o.b. Pittsburgh, with freight added to point of delivery, terms 60 days net, less 2 per cent off for cash in 10 days. Discounts on woven wire fencing are now 61 $\frac{1}{2}$ per cent off list for carload lots, 60 $\frac{1}{2}$ per cent for 1000-rod lots and 59 $\frac{1}{2}$ per cent for small lots, f.o.b. Pittsburgh.

Iron and Steel Bars.—One leading maker is offering Bessemer steel bars for fairly prompt shipment at 2.75c. at mill, while one or two other makers are quoting 2.50c. on either Bessemer or open-hearth steel bars for such deliveries as they can make, which would likely be last quarter. It is stated that few contracts, if any, have been closed by implement makers on their supply of steel bars for first half of next year. The mills are

standing pat on 2.50c. and even higher is quoted. A local maker sold recently about 12,000 tons of steel rounds to cover a large order for shells taken by a local interest. There is a fair demand for iron bars, but the consuming trade is covered for some time ahead and mills report specifications active. We quote steel bars at 2.50c. for such deliveries as the mills can make, which would be probably in last quarter, and 2.75c. at mill for fairly prompt shipment, this price being named by one leading maker. Small lots from warehouse are quoted at 3c. to 3.25c. We quote refined iron bars at 2.50c. to 2.65c., and railroad test bars, 2.70c. to 2.80c. at mill.

Rivets.—New inquiry is only fair, most consumers being covered over the remainder of the year. There is an active export demand and several sales for such shipment have been made recently by local makers. The supply of steel from the mills is better than for some time, and the output of rivets is again normal. We quote buttonhead structural rivets, $\frac{1}{2}$ in. in diameter and larger, at \$4 per 100 lb., base, and conehead boiler rivets same sizes, \$4.10 per 100 lb., base, f.o.b. Pittsburgh. Terms are 30 days net, or one-half of 1 per cent for cash in 10 days.

Shafting.—Several contracts have been made lately at 15 per cent off list for delivery in last quarter. Discounts range from 20 to 15 per cent off list, depending on the size of the order and the delivery wanted. Most consumers are covered over the remainder of the year and makers are largely sold up for the same period, but have a limited amount of shafting to spare for last quarter shipment. We quote cold-rolled shafting at 20 to 15 per cent off in carload lots for delivery in last quarter of this year and first quarter of 1917, and 10 per cent off in less than carload lots, f.o.b. Pittsburgh, freight added to point of delivery.

Hoops and Bands.—The minimum price of the leading makers on steel hoops and bands for such delivery as they can make is 2.75c. at mill, while as high as 3c. is quoted for fairly prompt delivery. We quote steel hoops and bands at 2.75c. to 3c., with extras on the latter as per the steel bar card, prices depending largely on the quantity and deliveries wanted.

Merchant Steel.—The consuming trade is pretty well covered over the remainder of the year and only small orders are being placed. All the mills are back in deliveries 8 to 10 weeks or longer, and prices are very strong. Prices on small lots for future delivery are about as follows: Iron-finished tire, $\frac{1}{2}$ x $1\frac{1}{2}$ in. and larger, 2.35c., base; under $\frac{1}{2}$ x $1\frac{1}{2}$ in., 2.50c.; planished tire, 2.55c.; channel tire, $\frac{1}{2}$ to $\frac{3}{4}$ and 1 in., 2.85c. to 2.95c.; 1 $\frac{1}{2}$ in. and larger, 3.25c.; toe chalk, 2.95c. to 3.05c., base; flat sleigh shoe, 2.70c.; concave and convex, 2.75c.; cutter shoe, tapered or bent, 3.25c. to 3.35c.; spring steel, 2.95c. to 3.05c.; machinery steel, smooth finish, 2.75c.

Cotton Ties.—It is expected that on or before July 1 the price of cotton ties for this season will be named by the makers. They have accumulated sufficient stocks to meet the expected demand.

Wrought Pipe.—Nothing definite can be learned in regard to the reported inquiry of the Sinclair Oil & Gas Company for an oil line for the Oklahoma fields. It is said this line, if built, will take from 125 to 200 miles of 8-in. pipe, but local pipe mills disclaim having the actual inquiry. The current demand for merchant pipe has quieted down. The amount of new business placed this month has not been so heavy as in May, while May showed a falling off as compared with April. However, the mills are filled up on lap weld pipe for two to three months and on some sizes five to six months. On butt weld sizes the mills can make prompt deliveries. Discounts on iron and steel pipe are firm and are given on another page.

Boiler Tubes.—New demand is not urgent, as nearly all consumers are covered for some time ahead, while mills are sold up on boiler and merchant tubes for four or five months. On seamless tubes makers are reported to be sold up for a year or more. Discounts are firm and are given on another page.

Coke.—A good deal of inquiry for blast-furnace coke

for last half delivery is in the market. Two Eastern furnaces are asking for 20,000 tons per month; a Shennango Valley furnace for 8000 to 10,000 tons a month; a Cleveland interest for 10,000 tons per month, and another Valley furnace for 8000 to 10,000 tons for July shipment. We note a sale of 10,000 to 12,000 tons per month of furnace coke for last half of the year at \$2.35 per net ton at oven, and this is regarded as a standard grade of coke. On the other hand, one interest placed contracts recently for 22,500 tons of furnace coke per month for last half of the year at \$2.65. It is believed that prices on the best grades of blast-furnace coke for last half of the year will range from \$2.35 for grades not so well known up to \$2.50 for the better grades, while several that have a high reputation in the trade will probably bring \$2.65. There is not much demand for furnace coke for prompt shipment and prices are easy. We quote best grades of furnace coke for prompt shipment at \$2.30 to \$2.40, and on contracts from \$2.35 to \$2.50, according to quality. We quote best grades of foundry coke for spot shipment at \$2.75 to \$3, and on contracts for last half of the year, \$3.25 to \$3.50 per net ton at oven. The Connellsville *Courier* gives the output of coke in the upper and lower Connellsville regions for the week ended June 10 as 405,804 net tons, a decrease over the previous week of 26,068 tons.

Old Material.—The local market seems to be badly demoralized, mainly because the offerings of scrap are very much heavier than the demand. In fact, it is almost impossible to sell scrap at any price. As showing the congested condition in regard to stocks held by some mills, it is stated that one local consumer sold recently to another 10,000 tons of the best heavy steel scrap at about \$16 per gross ton, delivered. A leading interest has bought lately a fair amount of borings and turnings for blast-furnace use, one sale being 1000 tons of borings at \$9.25 and 1000 tons of turnings at the same price, delivered at buyer's blast furnaces. There does not seem much prospect of early betterment either in the demand or in prices of scrap. Dealers quote for delivery in the Pittsburgh and nearby districts that take the same rates of freight, per gross ton, as follows:

Heavy steel melting scrap, Steubenville, Hollansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh, delivered	\$15.50 to \$16.00
No. 1 foundry cast	15.75 to 16.00
Rerolling rails, Newark and Cambridge, Ohio; Cumberland, Md., and Franklin, Pa.	16.50 to 16.75
Hydraulic compressed sheet scrap	14.50 to 14.75
Bundled sheet scrap, sides and ends, f.o.b. consumers' mills, Pittsburgh district	12.50 to 12.75
Bundled sheet stamping scrap	11.50 to 11.75
No. 1 railroad malleable stock	14.00 to 14.25
Railroad grate bars	11.00 to 11.25
Low phosphorus melting stock	19.00 to 19.50
Iron car axles	25.50 to 26.00
Steel car axles	26.00 to 26.50
Locomotive axles, steel	28.00 to 28.50
No. 1 busheling scrap	13.25 to 13.50
Machine-shop turnings	8.75 to 9.00
Old carwheels	14.00 to 14.50
Cast-iron borings	8.50 to 8.75
*Sheet bar crop ends	16.00 to 16.50
No. 1 railroad wrought scrap	18.75 to 19.00
Heavy steel axle turnings	12.00 to 12.25
Heavy breakable cast scrap	13.50 to 13.75

*Shipping point.

Chilean nitrate exports to the United States in March, 1916, were 2,338,534 quintals (1 quintal = 101.4 lb.), against 1,835,803 in March, 1915, and 1,155,351 in March, 1914. For the nine months ended March 31, 1916, the exports to the United States were 14,020,225 quintals, against 7,048,848 and 7,544,483 for the same period in 1915 and 1914 respectively. The increase to the United States is therefore about 100 per cent in each case. Despite the lack of ships, the total Chilean exports of nitrate were 41,870,408 quintals for the nine months to April 1, 1916, against 45,119,366 to April 1, 1914.

Steel forgings for guns of medium caliber, propeller shafts, etc., are to be made in a new department being established at the plant of the Sociedad de Altos Hornos de Vizcaya, Spain. Contracts for the necessary furnaces and hydraulic presses are said to have been placed in the United States.

Chicago

CHICAGO, ILL., June 20, 1916.

Special circumstances which have made steel in various forms available for early shipment have so multiplied as to obscure in a measure the general condition of oversold mill capacity. The resales of structural steel by fabricators who bought speculatively in the first quarter of the year, the offerings of Bessemer shapes, the marketing of large quantities of high carbon discarded steel in ingot, billet and bar form and the sharp checking of new inquiry which has restricted the market for steel at premium prices are not to be discounted nor yet to be magnified. The best that the principal mills can do in the production of mild-open-hearth steel through the remainder of the year seems certain to find them behind rather than ahead of their obligations for domestic shipment. Were they working themselves into much easier situations, the heavy tonnages now being offered them for export delivery at mill convenience would offset such a tendency. At the same time, unexpected shifts in rolling programs will at all times, as now, result in earlier deliveries of some orders and greater delays in others. Plates continue to command extreme prices for prompt shipment. New business in many lines is quiet. The pig-iron market is dull and the scrap market very soft.

Pig Iron.—Last week's inquiry from the American Brake Shoe & Foundry Company for about 3500 tons of foundry iron, the major portion to contain from 3 to 4 per cent silicon, has been followed by the placing of that business, largely in the South. Except for that transaction, the market has been flat. A scattering interest in carload lots has sufficed to absorb the iron in transit from the South for spot delivery, but even this buying was too limited to profit Northern producers. And the latter, because of the disarranging of their shipping schedules which has resulted from labor difficulties at several large foundries, have been especially desirous of disposing of a part of their daily production. Further change in prices has not materialized, with spot Southern iron selling as low as \$14.50, Birmingham, and Northern iron well established on the basis of \$19 at the furnace. It is still the expectation of producers that belated inquiry for last half iron is yet to appear, but, in general, stocks of iron at foundry yards are very large. For Lake Superior charcoal iron we quote delivery prices at Chicago to include a freight rate of \$1.75. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace and do not include a switching charge averaging 50c. per ton:

Lake Superior charcoal, Nos. 2 to 5.....	\$19.75
Lake Superior charcoal, No. 1.....	20.25
Lake Superior charcoal, No. 6 and Scotch.....	20.75
Northern coke foundry, No. 1.....	19.50
Northern coke foundry, No. 2.....	19.00
Northern coke foundry, No. 3.....	18.50
Southern coke, No. 1 f'dry and 1 soft, \$19.00 to \$19.50	
Southern coke, No. 2 f'dry and 2 soft, 18.50 to 19.00	
Malleable Bessemer.....	19.50
Basic.....	19.00 to 19.50
Low phosphorus.....	34.00 to 36.00
Silvery, 8 per cent.....	31.50
Bessemer ferrosilicon, 10 per cent.....	33.50 to 35.50

Rails and Track Supplies.—Except for one transaction involving a round lot of track fastenings, railroad buying continues unimportant. While it is apparent that the railroads will buy nothing further at the present level of prices the purchase of which can possibly be deferred, their still unsatisfied needs comprise a large part of the business which is expected to materialize upon the return of more normal conditions. Quotations are as follows: Standard railroad spikes, 2.75c., base; track bolts with square nuts, 3.25c. to 3.50c., base, all in carload lots, Chicago; tie-plates, \$50, f.o.b. mill, net ton; standard section, Bessemer rails, Chicago, \$33, base; open-hearth, \$35; light rails, 25 to 45 lb., \$40; 16 to 20 lb., \$41; 12 lb., \$42; 8 lb., \$43; angle bars, 2c., Chicago.

Structural Material.—The easier deliveries available with respect to structural steel may now be traced more readily to their causes. Local fabricators who are selling plain material for immediate delivery from stock are disposing of speculative tonnage bought in excess

of requirements or are preferring to take the large profit which current prices give them as against the contract basis on which the material shipped was from mill, rather than to fabricate the steel. Other offerings of structural shapes for early delivery from mill are largely of Bessemer steel. In a number of instances the expedient of shifting mill rollings is resulting in the delivery of material to customers at much earlier dates than was anticipated. Yet for the general run of open-hearth structural requirements the mill situation still limits delivery promises to mill convenience. The amount of steel available, from one source or another, for shipment in from three to six weeks has reduced all quotations to the common basis of 2.50c., Pittsburgh. Contracts for fabricated steel reported last week include 1200 tons for additional buildings at the Crane Company's Corwith plant, Chicago; 900 tons for Illinois Steel Company extensions at Gary; 200 tons for a Washburn-Crosby Company elevator, Minneapolis, and 200 tons for highway bridges at San Luis, Cal., all taken by the American Bridge Company, and 800 tons for a theater building at San Francisco, placed with the Golden Gate Iron Works. It is understood that 5000 tons of steel will be required for the new plant of the American Brass Company at Kenosha, Wis., and that it will be furnished by the American Bridge Company. We quote for Chicago delivery of structural steel from mill 2.689c.

The selling of structural shapes from stock by local fabricators has had an effect upon sales from store. We continue to quote for Chicago delivery of structural steel from jobbers' stock 3.10c.

Plates.—The disappearance of premium prices has been entirely in connection with other products than plates. Plates for third quarter delivery have been selling as low as 3.50c., Pittsburgh, but other producers report more business offered to them at 4c., for prompt shipment, than they are able to accept. Inquiry from the Pacific coast has continued in unusual volume. We quote for Chicago delivery of plates from mill on contract 3.089c., and for prompt shipment 3.689c. to 4.189c.

We quote for Chicago delivery of plates out of jobbers' stock 3.50c.

Sheets.—For blue annealed sheets in the wider widths, prices are increasingly stiff, and the business which can be placed at better than 3.25c., Pittsburgh, is exceptional. In the narrower widths, which can be rolled by a larger number of mills, blue annealed prices share somewhat in the softness that is more pronounced with respect to black sheets. The steadily declining price of spelter is making for more reasonable galvanized sheet quotations but there is still a limited market for galvanized products. We quote for Chicago delivery, blue annealed, No. 16 and heavier, 3.089c. to 3.339c.; box annealed, No. 17 and lighter, 2.939c. to 3.039c.; No. 28 galvanized, 4.939c. to 5.039c.

We quote for Chicago delivery of sheets out of stock, minimum prices applying on bundles of 25 or more, as follows: No. 10 blue annealed, 3.40c.; No. 28 black, 3.10c. to 3.20c.; No. 28 galvanized, 5.40c. to 5.50c.

Bars.—Reports from users of bar steel to the effect that delivery conditions are now pronouncedly easier are much more numerous. In the automobile industry buyers advise that steel bars and strip steel are generally available for shipment within six weeks. The rapidity with which the change in conditions has come about, as indicated in such reports, suggests that some tendencies have been magnified and full explanation has not always been made of special circumstances which have contributed to easier deliveries of certain kinds of material. The amount of high-carbon steel which is being offered in the form of both billets and bars is an important factor in this connection. There is a sharp conflict in evidence when the mill situation with respect to low-carbon billets and mild steel open-hearth bars are considered. Some mills are also in a position to furnish Bessemer bars for reasonably prompt delivery. Some high-carbon billets that have been discarded for ammunition purposes are being rolled into reinforcing bars and are the basis for reports of concessions attributed to rail carbon bar steel. The demand for bar iron is limited, but except for a recent offering by one interest on the basis of 2.25c., Chicago, since discon-

tinued, the market continues firmly at 2.35c. We quote, mill shipment, Chicago, as follows: Bar iron, 2.35c.; soft steel bars, 2.689c.; nominal on contracts, 3.18c. for prompt shipment; hard steel bars, 2.50c.; shafting, in carloads, 20 per cent off; less carloads, 15 per cent off.

We quote store prices for Chicago delivery: Soft steel bars, 3.10c.; bar iron, 3.10c.; reinforcing bars, 3.10c.; base with 5c. extra for twisting in sizes $\frac{1}{2}$ in. and over and usual card extras for smaller sizes; shafting 10 per cent above list.

Cast-Iron Pipe.—A number of small lots of pipe are up for figures but the coming week's schedule includes no prospective business of size. We quote as follows, per net ton, Chicago: Water pipe, 4 in., \$33.50 to \$34; 6 in. and larger, \$30.50 to \$31, with \$1 extra for class A water pipe and gas pipe.

Rivets and Bolts.—Bolt makers find but little let-up in the demands upon them, but deliveries are now so protracted as to prevent a much greater accumulation on the mill books, customers limiting their new orders to what can be most favorably placed. Rivet sales are fair in quantity, and prices appear to be very firm on the basis of 3.75c., Chicago. We quote carriage bolts up to $\frac{1}{2}$ x 6 in., rolled thread, 50-10-5; cut thread, 50-5; larger sizes, 40-5; machine bolts up to $\frac{1}{2}$ x 4 in., rolled thread, with hot pressed square nuts, 50-10-10; cut thread, 50-10; larger sizes, 40-10-5; gimlet point coach screws, 60; hot pressed nuts, square, \$2.90 off per 100 lb.; hexagon, \$2.90 off. Structural rivets, $\frac{1}{4}$ to $1\frac{1}{4}$ in., 3.50c. to 3.75c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

We quote out of store: Structural rivets, 3.50c.; boiler rivets, 3.60c.; machine bolts up to $\frac{1}{2}$ x 4 in., 60-10; larger sizes, 50-10; carriage bolts up to $\frac{1}{2}$ x 6 in., 60-5; larger sizes, 50 off; hot pressed nuts, square, \$3.25, and hexagon, \$3.25 off per 100 lb.; lag screws, 65.

Old Material.—The buying of scrap in this market remains at a minimum, with scarcely enough purchases to establish a level of prices at consumers' works. Sales of carload lots on track are for the most part the extent of buying. Most consumers are still receiving heavy shipments on old orders, but the limitation of new buying is so drastic that accumulated stocks are being generally drawn upon for current consumption. Railroad offerings have been selling at exceedingly low prices, and have largely determined the minimum quotations in the market. Additional lists for the current week are of small importance as to tonnage, the Rock Island alone having a sizeable quantity, approximating 4000 tons. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton

Old iron rails	\$18.00 to \$18.50
Relaying rails	19.50 to 20.50
Old carwheels	12.25 to 12.50
Old steel rails, rerolling	15.00 to 15.50
Old steel rails, less than 3 ft.	15.00 to 15.25
Heavy melting steel scrap	14.50 to 15.00
Frogs, switches and guards, cut apart	14.50 to 15.00
Shoveling steel	13.25 to 13.75
Steel axle turnings	9.25 to 9.75

Per Net Ton

Iron angles and splice bars	\$18.25 to \$18.75
Iron arch bars and transoms	19.50 to 20.00
Steel angle bars	13.50 to 14.00
Iron car axles	22.50 to 23.00
Steel car axles	22.75 to 23.25
No. 1 railroad wrought	15.00 to 15.25
No. 2 railroad wrought	13.75 to 14.00
Cut forge	13.75 to 14.00
Pipes and flues	10.75 to 11.00
No. 1 busheling	12.00 to 12.50
No. 2 busheling	8.25 to 8.50
Steel knuckles and couplers	14.75 to 15.25
Steel springs	18.25 to 18.75
No. 1 boilers, cut to sheets and rings	9.25 to 9.75
Boiler punchings	13.50 to 14.00
Locomotive tires, smooth	20.00 to 20.50
Machine shop turnings	5.50 to 6.00
Cast borings	5.50 to 6.00
No. 1 cast scrap	11.50 to 12.00
Stove plate and light cast scrap	9.25 to 9.75
Grate bars	10.00 to 10.25
Brake shoes	9.75 to 10.25
Railroad malleable	11.75 to 12.25
Agricultural malleable	10.75 to 11.25

Wire Products.—The prospect of additional heavy sales of barb wire for export is at the foundation of general reports of further advance in price, and some of the independent manufacturers are already quoting on a higher basis. No general announcement of an advance in quotations has been made to the trade. We quote as follows: Plain wire, No. 8 and coarser, base,

\$2.639; wire nails, \$2.689; painted barb wire, \$2.839; galvanized barb wire, \$3.539; polished staples, \$2.839; galvanized staples, \$3.539, all Chicago.

Philadelphia

PHILADELPHIA, PA., June 20, 1916.

The pig-iron market is dull and easier, with practically all interest confined to export business, which chiefly involves Bessemer. Consumers of iron are not holding up shipments in this territory, and it is evident that they are melting iron, if they are not buying it. Plates continue in great demand and are as strong as ever. Structural shapes, however, are in less demand for investment propositions, inasmuch as the projectors are faced by high prices for building materials of all kinds, and are delaying the execution of their plans. Bessemer bars and shapes are more easily obtainable than open-hearth. The old material market is extremely dull and prices continue on their downward course, caused by the oversupply of scrap.

Pig Iron.—The market is inactive except for the large amount of export inquiry, considerable of which has resulted in sales. An eastern Pennsylvania steel company is credited with having placed 20,000 or more tons of Bessemer for export. Despite the fact that some of the inquiry appears to have been quite widely distributed, definite facts as to the original sources of the inquiry are illusive. The domestic market is flat, and prices are easier in certain directions because some sellers, in their anxiety to get what little business is stirring, will cut prices. It is highly probable that a test of the market would show that \$20, Philadelphia, for No. 2 X, could be shaded. On the other hand, there have been sales of small lots at \$20, furnace, and one of 700 tons at that price. A leading Virginia producer is emphatic in declaring that he is adhering to \$18.50, furnace, or \$21.25, Philadelphia, for No. 2 X, and 50c. less for No. 2 plain. A 1000-ton lot of basic is reported to have been sold lately at \$19, delivered. Standard low phosphorus, which has been fairly active in the past three or four days, is off about \$1 per ton and is now quoted at \$33 to \$34, Philadelphia. Lebanon low phosphorus has been quiet, and remains unchanged at \$29 to \$30, furnace. Not much improvement in the iron situation is looked for until some time in August. Although strike troubles are holding up deliveries in some other parts of the country, there is little interference of that sort in or near Philadelphia. Quotations for standard brands, delivered in buyers' yards, prompt shipment, range about as follows:

Eastern Pa., No. 2 X foundry	\$19.75 to \$20.25
Eastern Pa., No. 2 plain	19.50 to 20.00
Virginia, No. 2 X foundry	21.25
Virginia, No. 2 plain	20.75
Gray forge	19.50
Basic	19.50 to 20.00
Standard low phosphorus	33.00 to 34.00

Iron Ore.—Arrivals of foreign ore at this port in the week ended June 17 consisted of 11,500 tons from Cuba. The feeling is growing that inadequate transportation facilities may cause a shortage of domestic ore later this year, though not to the extent which some authorities predict.

Ferroalloys.—The situation shows no change except that it is definitely established that domestic makers will accept \$225, seaboard, for prompt shipment, and this price is regarded as easy. The material so quoted is termed restricted in that neither it nor the steel which it enters can be shipped abroad without Great Britain's consent. Unrestricted material is higher by at least \$25. Arrivals of English 80 per cent ferromanganese at this port last week totaled 813 tons.

Plates.—No easiness is apparent, either as to quotations or deliveries, and the unfilled orders of the principal mills are undiminished. Large makers continue to quote 4c., Pittsburgh, or 4.159c., Philadelphia, although one will supply certain sizes in three or four weeks at 3.909c., Philadelphia.

Bars.—The quotations for steel bars cover a rather wide range, as determined by size, deliveries and character of steel. Bessemer bars are quoted at 2.909c.,

Philadelphia, while open-hearth bars range from 3.159c. to 3.959c. for fairly early deliveries. Iron bars are firm at 2.659c., Philadelphia. It is noticed that while a good-sized tonnage of iron bars is under inquiry, manufacturers and jobbers are not stocking up. Concrete reinforcing bars are weaker, concessions having been offered, in particular, by the makers of a new patented bar.

Structural Material.—New propositions of an investment character are so few that there is little to test the market, a situation attributed to the high cost of building materials generally. At the same time plans are accumulating, and the delay in their execution means great activity at some future time. Meanwhile the mills have plenty of orders wherewith to keep busy for some time to come. One mill quotes 2.909c. to 3.159c., Philadelphia (Bessemer), while another quotes a minimum of 3.159c. for open-hearth steel.

Billets.—Quotations are unchanged at \$50 for open-hearth rerolling billets and \$65 for forging steel.

Sheets.—The principal Eastern maker is not anxious for more business and continues to quote 4.159c., Philadelphia.

Coke.—Some inquiry for furnace coke is reported. Prompt furnace is quoted at \$2.40 to \$2.50 per net ton at oven, and contract at \$2.50 to \$2.75. Prompt foundry ranges from \$8.25 to \$3.50 per net ton at oven, and contract at \$3.40 to \$3.50. Freight rates from the principal producing districts are as follows: Connellsville, \$2.05; Latrobe, \$1.85, and Mountain, \$1.65.

Old Material.—On every side there is an oversupply of scrap and a consequent lack of interest in new business. Prices of several grades are lower. Quotations for delivery in buyers' yards in this district, covering eastern Pennsylvania, and taking freight rates from 35c. to \$1.35 per gross ton, are as follows:

No. 1 heavy melting steel	\$15.00 to \$15.50
Old steel rails, rerolling	17.00 to 18.00
Low phos. heavy melting steel scrap	22.50 to 23.25
Old steel axles	26.00 to 27.00
Old iron axles	28.00 to 29.00
Old iron rails	20.00 to 20.50
Old carwheels	16.50 to 17.00
No. 1 railroad wrought	20.00 to 20.50
Wrought-iron pipe	12.75 to 13.25
No. 1 forge fire	13.50 to 14.00
Bundled sheets	13.50 to 14.00
No. 2 busheling	10.50 to 11.00
Machine shop turnings	8.50 to 9.00
Cast borings	10.00 to 10.50
No. 1 cast	16.00 to 16.50
Grate bars, railroad	11.75 to 12.25
Stove plate	11.75 to 12.25
Railroad malleable	13.50 to 14.00

Cleveland

CLEVELAND, OHIO, June 20, 1916.

Iron Ore.—Ore is still moving forward at a record-breaking pace. There is a fair demand for vessel capacity at the current rate of \$1 per ton, but not much wild tonnage is available. Labor troubles have broken out in a few of the Mesaba mines as a result of the activity of the I. W. W.; but as miners are earning more than ever before and are generally satisfied with conditions, the efforts of the agitators have so far not made much headway. We quote prices as follows, delivered lower Lake ports: Old range Bessemer, \$4.45; Mesaba Bessemer, \$4.20; old range non-Bessemer, \$3.70; Mesaba non-Bessemer, \$3.55.

Pig Iron.—The General Electric Company has purchased 4000 tons of foundry iron and 500 tons of malleable from a Cleveland interest for delivery at its Erie plant over the last five months of the year. Southern furnaces attempted to take this business, quoting \$19.05, delivered, for No. 2. We also note the sale by a Cleveland producer of 2000 tons of Bessemer iron for prompt shipment to Italy. The local market is dull, but shipments are as heavy as ever. Southern prices are weak. Furnaces are quoting at \$14.50, Birmingham, for No. 2 for last half of 1916, though for the first half of 1917 the general asking price is \$15. Southern resale iron, which has forced down the furnace prices, is quoted at \$13.50 to \$14 for No. 2. In spite of the lower prices the demand is light. The weakness in Southern iron has so far had little or no effect on

Northern prices in this territory, and a few small-lot sales have been made in the past few days by Cleveland and Valley furnaces at \$18.50 at furnace for No. 2. Although prices have not been tested under existing conditions, some of the Northern producers declare they will not meet Southern competition. Ohio silvery is still quoted at \$27 to \$29 at furnace, but if necessary makers will shade the lower price to prevent business going to the Tennessee furnaces, which are making lower quotations. We quote, delivered Cleveland, as follows:

Bessemer	.....	\$21.95
Basic	.....	\$18.95 to 19.30
Northern No. 2 foundry	.....	19.00 to 19.30
Southern No. 2 foundry	.....	18.00 to 18.50
Gray forge	.....	18.75
Jackson Co. silvery, 8 per cent. silicon	28.62 to	30.62
Standard low phos., Valley furnace	.....	32.00

Coke.—There is practically no activity in the coke market and prices are unchanged at \$3 to \$3.25 per net ton at oven, for standard Connellsville foundry coke for prompt shipment, and \$3.25 to \$3.50 for contracts. Connellsville furnace coke is quoted at \$2.75 for last half.

Finished Iron and Steel.—There is a fair demand for steel bars for prompt shipment, and they are somewhat easier, Bessemer steel bars being quoted at 2.50c. to 3c., Pittsburgh, as compared with the minimum price of 2.75c. a few days ago. Structural material in Bessemer steel is quoted at 2.75c. to 3c. for prompt shipment, and some third quarter contracts, both for Bessemer bars and structural shapes, are being closed at 2.75c. While prices for prompt shipment are easier, the market for steel for future delivery is apparently as firm as it has been. There is more of a disposition among the mills to make contracts not subject to cancellation or price readjustment, and this is eliminating speculative buying. Mills have not yet opened their books in this territory for steel for delivery next year. The plate market is firm at 3.50c. to 4c., Pittsburgh. Practically all of the larger plate consumers in this territory have third quarter contracts at 3.25c. to 3.50c. The Lake shipbuilding industry is quiet as regards new business, but there are inquiries for two vessels for the coast trade, requiring about 2200 tons of steel. In structural lines there is a good demand for lots under 100 tons but little inquiry for larger lots for building purposes. The only new inquiry reported is for 400 tons for a new plant for the National Artificial Silk Company in Cleveland. The sheet market has quieted down considerably, and a weakness has developed in galvanized sheets owing to the condition of the spelter market. Some mills desiring to unload their surplus stocks are understood to be offering galvanized sheets as low as 4.50c. at mill for No. 28, although the general quotation is from 4.65c. to 4.90c. Black sheets are firm at 2.90c. to 3c. for No. 28 and blue annealed at 3c. to 3.25c. for No. 10. Iron bars are unchanged at 2.50c. to 2.60c., Cleveland. Warehouse business continues active and prices are unchanged at 3.25c. for steel bars and structural material, 3.65c. for plates and 3.20c. for iron bars.

Bolts, Nuts and Rivets.—Specifications for bolts and nuts are heavy, but not much new business is coming out, as consumers are about all under contract. Prices are firm. The volume of rivet business has fallen off, following the recent heavy buying, but specifications continue very heavy. We quote structural rivets at 4c., Pittsburgh, and boiler rivets at 4.10c. for prompt shipment and contracts. Bolt and nut discounts are as follows:

Common carriage bolts, $\frac{3}{8}$ x 6 in., smaller or shorter, rolled thread, 50 and 10; cut thread, 50; larger or longer, 40; machine bolts with h. p. nuts, $\frac{3}{8}$ x 4 in., smaller and shorter, rolled thread, 50, 10 and 5; cut thread, 50 and 5; larger and longer, 40 and 10; lag bolts, gimlet or cone point, 50 and 10; square h. p. nuts, blank or tapped, \$2.90 off the list; hexagon, h. p. nuts, blank or tapped, \$2.90 off; c. p. c. and t. square nuts, blank or tapped, \$2.60; hexagon nuts, all sizes, \$3 off; cold pressed semi-finished hexagon nuts, all sizes, 60 and 10.

Old Material.—The market is dull and weak. Only small lots are being sold—for the most part material on track which dealers want to move quickly and let go at lower prices. Sales of heavy melting steel are reported down to \$15, and borings are down 25c. per ton. No new demand has developed for busheling, on which the price

is nominally about 25c. per ton lower. Embargoes are still in effect at the plants of Corrigan, McKinney & Co. and the Upson Nut Company in Cleveland and at the Brier Hill Steel Company in Youngstown, while the Republic Iron & Steel Company is holding up shipments. We quote, f.o.b. Cleveland, as follows:

Per Gross Ton	
Steel rails	\$15.50 to \$16.00
Iron rails	18.50 to 19.00
Steel car axles	28.00 to 29.00
Heavy melting steel	15.00 to 15.25
Carwheels	13.50 to 13.75
Relaying rails, 50 lb. and over	22.50
Agricultural malleable	12.50 to 12.75
Railroad malleable	15.50
Steel axle turnings	12.00 to 12.25
Light bundled sheet scrap	12.00 to 12.25

Per Net Ton	
Iron car axles	\$23.00 to \$24.00
Cast borings	5.75 to 6.00
Iron and steel turnings and drillings	6.25 to 6.50
No. 1 busheling	12.50 to 13.00
No. 1 railroad wrought (nominal)	15.00 to 15.50
No. 1 cast	14.00 to 14.25
Railroad grate bars	9.00 to 9.50
Stove plate	10.00 to 10.25

The Fertel-Dangler-Wilson Company has taken over the business formerly conducted as the Fertel Company, dealer in iron, steel and metals, Cleveland, Ohio. The officers of the new company are: C. S. Dangler, president; F. B. Dangler and M. H. Wilson, Jr., vice-presidents; I. F. Freiberger, secretary, and S. Fertel, treasurer and general manager.

Cincinnati

CINCINNATI, OHIO, June 21, 1916.—(By Wire.)

Pig Iron.—If anything, the market is quieter than at this time last week. The only general inquiry out is for 500 tons of high manganese foundry iron for last half shipment for a central Indiana melter. Southern prices are softer on resale iron, but the furnaces are holding at \$14.50 to \$15.50, Birmingham basis, for this year's shipment. It is stated that first half contracts can also be made at the minimum figure. Many rumors are circulated as to what holders of warrants are willing to accept. It is known that some warrant iron has been offered as low as \$13.50, Birmingham, for immediate acceptance, but these offers were made to agents and not to consumers. Whether any transactions have taken place is now simply a matter of conjecture. Consumers are indifferent, and it is doubtful if any reductions will bring them in the market. The Northern furnaces are holding at \$19, Ironton, with some resale iron said to be obtainable below \$18.50, but this rumor cannot be substantiated. Shipments on contract are going forward satisfactorily, and while stocks are slowly increasing in the South it is stated on good authority that in the month of May, taking all of the Ohio furnaces into consideration, that considerably more iron was shipped out than was made, but a good part of this was basic iron. Malleable is very quiet, and all melters in this territory are understood to have provided for their requirements some time in advance. Based on freight rates of \$2.90 from Birmingham and \$1.26 from Ironton, we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft.	\$17.90 to \$18.40
Southern coke, No. 2 f'dry and 2 soft.	17.40 to 17.90
Southern coke, No. 3 foundry	16.90 to 17.40
Southern coke, No. 4 foundry	16.40 to 16.90
Southern gray forge	15.90 to 16.40
Ohio silvery, 8 per cent silicon	28.26 to 28.76
Southern Ohio coke, No. 1	20.76 to 21.26
Southern Ohio coke, No. 2	19.76 to 20.26
Southern Ohio coke, No. 3	19.26 to 19.76
Southern Ohio malleable Bessemer	19.76 to 20.26
Basic, Northern	19.76 to 20.26
Lake Superior charcoal	21.20 to 22.20
Standard Southern carwheel	24.90 to 25.40

(By Mail)

Coke.—No demand for either furnace or foundry coke is reported from any source. Rumors that a few Southern furnaces are in the market cannot be substantiated. Foundry coke is moving on old contracts, and no requests to hold up shipments have been made, thus indicating that the foundry trade is consuming its full share of coke at the present time. It is stated that Connellsville furnace coke can still be obtained at \$2.25 to \$2.40 per net ton at oven for prompt shipment,

but contract figures are close to \$2.50 to \$2.65, with a few interests asking \$2.75. Foundry coke is stationary at \$2.50 to \$2.75 for either prompt or future shipment. Wise County and Pocahontas operators report business quiet. New River foundry coke is held around \$4 at oven, with little business being transacted.

Finished Material.—Warehouse business has eased off, but is still very good, if present high costs are taken into consideration. Mill supply and hardware jobbers notice only a slight let-up, attributable to some extent to weather conditions which have retarded building operations. We quote from stock No. 10 blue annealed sheets at 3.50c.; steel bars and small structural shapes, \$3.20c.; wire nails, \$2.75 per keg base; barb wire, \$3.60 per 100 lb.; plates, 3.50c.; smaller sizes machine bolts 60 per cent off list; larger sizes, 40 and 10 and 5 per cent off; hot pressed square and hexagon nuts, 2.70c. off list; malleable washers, 5½c. per lb.; cast-iron washers, 3c. per lb., and cold rolled rounds 10 per cent plus list. The nearby mills are quoting No. 28 black sheets from 3c. to 3.10c. and No. 28 galvanized from 4.90c. to 5c., f.o.b. Cincinnati or Newport, Ky. Business in both black and galvanized sheets is said to be fairly good.

Old Material.—Prices on practically all grades of scrap are so unstable that a general average is hard to obtain. The rolling mills are not buying, and the foundry consumption, while above normal, is not sufficient to take care of the cast scrap that is being offered. Iron axles and locomotive tires are stronger than any other grades on the market, while cast borings are now about on the same level as when pig iron was \$2 per ton lower. The following are dealers' prices to consumers, f.o.b. at yards, southern Ohio and Cincinnati:

Per Gross Ton	
Bundled sheet scrap	\$11.25 to \$11.75
Old iron rails	15.50 to 16.00
Relaying rails, 50 lb. and up	21.00 to 21.50
Rerolling steel rails	14.50 to 15.00
Heavy melting steel scrap	14.00 to 14.50
Steel rails for melting	13.00 to 13.50

Per Net Ton	
No. 1 railroad wrought	\$13.25 to \$13.75
Cast borings	4.75 to 5.25
Steel turnings	5.25 to 5.75
Railroad cast scrap	11.00 to 11.50
No. 1 machinery cast scrap	12.75 to 13.25
Burnt scrap	8.25 to 8.75
Iron axles	21.00 to 22.00
Locomotive tires (smooth inside)	19.00 to 19.50
Pipes and flues	9.50 to 10.00
Malleable and steel scrap	10.75 to 11.25
Railroad tank and sheet scrap	8.50 to 9.00

Buffalo

BUFFALO, N. Y., June 20, 1916.

Pig Iron.—Events show that Buffalo furnaces are not the low sellers in the current market, as several large melters in the central part of New York State, last week reported as being in the market for large amounts, have placed a large portion of the iron inquired for with southwestern Pennsylvania and eastern Pennsylvania furnaces, which have a fairly high rate of freight to New York State points. As reported last week, the majority of the furnacemen of the district have stiffened prices on account of sold-up conditions, and one of the leading producing interests of the Buffalo district is out of the market for the remainder of the year. Sales of the week make but a small aggregate. We continue to quote as follows, f.o.b. furnace, Buffalo, for current and last half deliveries, extending in some instances into first half of 1917:

No. 1 foundry	\$19.50 to \$20.00
No. 2 X foundry	18.50 to 19.50
No. 2 plain	18.50 to 19.00
No. 3 foundry	18.50 to 18.75
Gray forge	18.50
Malleable	18.50 to 19.50
Basic	19.50 to 20.00
Bessemer	21.00 to 22.00
Charcoal, regular brands and analysis	21.00 to 22.00

Finished Iron and Steel.—If mills could take on additional business for 1916 delivery there would be no difficulty in securing large orders from users. Such specifications from regular customers are accepted for delivery only at mill's convenience, which will carry shipment into 1917. Sellers are still disinclined to consider strictly 1917 business. No change is noted in

prices except for wire products, plain wire having been advanced from \$2.45 to \$2.65, Pittsburgh. The Trussed Concrete Steel Company, Buffalo, will supply deformed bars for the Corning Glass Company, Corning, N. Y. Structural steel work open includes 200 tons for Troop H armory, Rochester, and 150 to 200 tons for the Hammermill Paper Company, Erie, Pa. The Buffalo Structural Steel Company will supply 200 tons of steel for the Pomeroy-Wright store and office building, Buffalo; 125 tons for the Niagara Electro Chemical Company, Niagara Falls, N. Y.; 100 tons for the Myrick Machine Company, Olean, N. Y., and steel for the new finishing mill for the Wickwire Steel Company, Buffalo. The Lackawanna Bridge Company has 100 tons for the Little Falls Felt Shoe Company, Little Falls, N. Y., and the Groton Bridge Company, Groton, N. Y., 150 tons for the Cortland Forging & Machine Works, Corning, N. Y.

Old Material.—Expectations of dealers with reference to an improvement in the near future are stronger. Embargoes have been lifted by a number of plants, and the belief is expressed in the yards of the district that within a week or two the price schedules will show a tendency to stiffen. The material on tracks and forced upon the market last week as a result of the embargoes has been sold. It is reported that a few inquiries of considerable tonnage are about to come out from consumers. Prices remain as quoted last week, as follows, per gross ton, f.o.b. Buffalo:

Heavy melting steel	\$15.50 to \$16.00
Low phosphorus steel	20.00 to 20.50
No. 1 railroad wrought scrap	17.25 to 17.75
No. 1 railroad and machinery cast scrap	15.50 to 16.00
Steel axles	24.00 to 24.50
Iron axles	24.00 to 24.50
Carwheels	13.50 to 14.00
Railroad malleable	15.00 to 15.50
Machine shop turnings	7.00 to 7.50
Heavy axle turnings	12.00
Clean cast borings	8.00 to 8.25
Iron rails	18.00 to 18.50
Locomotive grate bars	11.50 to 12.00
Stove plate (net ton)	11.00 to 11.50
Wrought pipe	12.00 to 12.50
Bundled sheet scrap	11.50 to 12.00
No. 1 busheling	13.00 to 13.50
No. 2 busheling	11.00 to 11.50
Bundled tin scrap	15.00 to 15.50

Birmingham

BIRMINGHAM, ALA., June 19, 1916.

Pig Iron.—The local iron market is weak and will remain so until there is a sufficient volume of trading to establish a basis. The persistent offer of resale metal is a rank disturber. It is offered below \$14, although some has sold at slightly above that figure. There are so few takers of the 40,000 to 50,000 tons of free warrants in the Alabama yards that it serves more to hamper furnace iron than establish a real market. Consumers consider it when offered and then, when all the conditions surrounding transactions are realized, as promptly back off. It is a cudgel for lower prices of furnace metal principally. Furnacemen have not openly marked prices below \$15, the scattering sales they are making being done on that basis. Some under-analysis iron goes under that figure. No one is bidding for \$15.50 metal for 1917 delivery. There must be a buying movement before there is a market. What the large consumers will pay for metal around July 1, if they buy then, will settle the question. To say that large quantities could be had under \$15 is a mere expression of *prima facie* conditions. One big deal at \$14.50 to \$14.75 might re-establish the \$15 basis. The movement of pig iron from yards is satisfactory. The Car Service Association reports 82,555 cars moved in May, an increase of 24,840 over May, 1915, and 57 cars over April this year. While the May iron output was 223,000 tons—another high record—stocks in yards remained practically stationary at a little over 250,000 tons of all kinds. Total stocks at this time last year were 367,000 tons. Operators appear to be sufficiently confident of the future to resume operations at idle plants as per schedule, Woodstock and one Sloss-Sheffield being mapped for the next ten days. Furnaces still ask \$15 for the rest of the year. We quote, per gross

ton, f.o.b. Birmingham district furnaces, as follows:

No. 1 soft and foundry	\$15.25 to \$15.50
No. 2 soft and foundry	14.75 to 15.00
No. 3 foundry	14.25 to 14.50
No. 4 foundry	14.00 to 14.25
Gray forge	13.75 to 14.00
Basis	14.75 to 15.00
Charcoal	22.00 to 22.50

Coal and Coke.—The production of coal has been stimulated by the recent award of large contracts by railroads and other consuming interests and the better prices obtained here and there. Coke is moving out as rapidly as manufactured. Car service is in better form. Prices are firm around \$4.25 to \$4.50 per net ton at oven for high-grade foundry coke.

Cast-Iron Pipe.—Birmingham pipe makers are well satisfied with the situation and foundry operations continue on a large scale. The prospect of more business with South and Central America is encouraging. We quote, per net ton, f.o.b. pipe shop yards, as follows: 4-in., \$28; 6-in. and upward, \$25, with \$1 additional for gas pipe and 16-ft. lengths.

Old Material.—Scrap is still soft and last week's reduced quotations are not always secured in actual transactions. No special grade is active, but steel is moving more freely than others. We quote, per gross ton, f.o.b. dealers' yards, as follows:

Old steel axles	\$24.00 to \$25.00
Old steel rails	11.00 to 11.25
No. 1 steel scrap	9.50 to 10.00
No. 1 wrought scrap	13.00 to 13.50
No. 1 cast scrap	11.00 to 11.50
Extra heavy cast scrap	9.50 to 10.00
Stove plate and light	10.00 to 10.50
Old carwheels	10.50 to 11.00
Tram carwheels	9.50 to 10.00

St. Louis

ST. LOUIS, Mo., June 19, 1916.

Pig Iron.—Buying has been almost altogether of lots below 100 tons for immediate needs or special purposes. Shipments on specifications under contracts continue to be urged forward by the melters. Competition for a large quantity might, it is claimed, bring out price concessions from furnaces.

Coke.—Some small sales have been made. By-product coke is quietly held on a parity with the beehive prices.

Old Material.—Prices are nominal. All industries in this vicinity are enforcing embargoes as well as stiffening still further their rejections. Standard section steel rails are firmly held and so are the lighter weights, with supplies at a minimum. We quote dealers' prices, f.o.b. customers' works, St. Louis industrial district, as follows:

Per Gross Ton	
Old iron rails	\$16.25 to \$16.75
Old steel rails, rerolling	15.25 to 15.75
Old steel rails, less than 3 ft.	15.75 to 16.25
Relaying rails, standard section, subject to inspection	22.00 to 23.00
Old carwheels	11.25 to 11.75
No. 1 railroad heavy melting steel scrap	15.00 to 15.50
Heavy shoveling steel	12.50 to 12.75
Frogs, switches and guards cut apart	14.25 to 14.75
Bundled sheet scrap	9.25 to 9.75

Per Net Ton	
Iron angle bars	\$15.25 to \$15.75
Steel angle bars	12.75 to 13.25
Iron car axles	22.75 to 23.25
Steel car axles	24.00 to 24.50
Wrought arch bars and transoms	19.00 to 19.50
No. 1 railroad wrought	14.75 to 15.00
No. 2 railroad wrought	14.50 to 14.75
Railroad springs	13.25 to 13.75
Steel couplers and knuckles	13.25 to 13.75
Locomotive tires, 42 in. and over, smooth inside	18.25 to 18.75
No. 1 dealers' forge	10.25 to 10.75
Mixed borings	5.50 to 6.00
No. 1 busheling	12.25 to 12.50
No. 1 boilers, cut to sheets and rings	8.00 to 8.50
No. 1 railroad cast scrap	11.00 to 11.50
Stove plate and light cast scrap	8.25 to 8.75
Railroad malleable	10.50 to 11.00
Agricultural malleable	9.50 to 10.00
Pipes and flues	9.50 to 10.00
Railroad sheet and tank scrap	9.00 to 9.50
Railroad grate bars	8.25 to 8.75
Machine shop turnings	6.75 to 7.00

Finished Iron and Steel.—There has been practically no new buying. Such new demand as develops is taken care of through the warehouses. Movement out of

warehouse continues very heavy and quotations are: Soft steel bars, 3.15c.; iron bars, 3.10c.; structural material, 3.15c.; tank plates, 3.55c.; No. 10 blue annealed sheets, 3.30c.; No. 28 black sheets, cold-rolled, one pass, 3.30c.; No. 28 galvanized sheets, black sheet gage, 5.55c.

San Francisco

SAN FRANCISCO, CAL., June 13, 1916.

Business is apparently quieting down a little for the summer. High prices also have a restraining influence on buying, this being most apparent in materials used in building. Prices are as firm as ever, with some intimations of further advances. Merchants having covered this year's needs, are making few new purchases, but specifications on contracts continue heavy. Special inquiries are numerous, mostly for early delivery, and the inability of mills to ship promptly prevents activity in this line.

Bars.—Specifications on contracts are large, and the local mills continue to book considerable business ahead. Manufacturers are taking from store what they cannot get promptly from the mills. A substantial tonnage is wanted for heavy construction work in the interior, including both plain and reinforcing bars. Local mills quote about 3.50c. on carloads of steel bars for late summer delivery, small lots from store being held at 4c.

Structural Material.—Building continues comparatively quiet. A few factory buildings are appearing, but they are usually small. Plans are under way for a theater building at Fourth and Market streets. A number of large State buildings have been authorized, but so far little has been done toward getting the plans. Some of the local fabricators have been occupied with dredge construction and other special work, and the tonnage taken by shipbuilders and other manufacturers is well maintained.

Rails.—There has been no important movement of standard sections in California recently, as the financial position of many of the roads prevents any extensive development. The logging, mining and other industries are placing numerous small orders for light rails, but keep the quantity as low as possible. The market for relaying rails is exceptionally strong.

Plates.—Shipbuilding contracts are coming through a little less rapidly, but that apparently is due to the inability of present plants to handle more work, and the plate tonnage is limited by deliveries rather than demand. Gold dredge construction in the interior is an important item, and a few good sized tank and pipe inquiries are still coming out. Present prices, however, are in many cases causing the substitution of wood for riveted pipe. For prompt delivery, it is hard to get anything below 3.75c., Pittsburgh; and the local jobbing price is 4.75c.

Sheets.—A slightly easier feeling is noted on galvanized, and buyers are taking a very conservative attitude. The demand for light riveted pipe and irrigation specialties, however, is causing slightly more inquiry in some quarters. The movement of blue annealed, though quite large, is almost entirely on contracts or from store, with practically nothing offered for early shipment from mills. The city of Lovelock, Nev., is in the market for a large lot of light riveted pipe, 8, 10 and 12 in.

Wrought Pipe.—The oil-field business shows every indication of continuance of activity for a considerable period. Deliveries are extremely slow, turning practically all consumers' business to merchants' stocks. Small pipe receives little attention, apparently due to lack of building activity.

Cast-Iron Pipe.—Municipal business is still lacking. The volume of business holds about normal, however, as water companies are placing frequent small orders to take care of necessary extensions and repairs. Prices remain at \$36 per net ton for 6-in. and over; \$39 for 4-in.; and \$1 extra for class A and gas pipe.

Pig Iron.—Foundries continue quite busy, but they are now pretty well supplied for several months to come, and it is believed that the principal require-

ments for the rest of the year have been covered by contracts. New business is accordingly quiet. No. 1 Southern foundry iron is quoted here at about \$26 to \$26.50 per gross ton.

Coke.—The larger consumers are now carrying a fair supply and have shipments coming in at frequent intervals on contracts. There is accordingly little activity in the way of new purchases. Southern foundry coke is quoted at a rather wide range of prices, \$16 per net ton being about the average figure.

Old Material.—The consuming demand for steel melting scrap continues as large as ever, and the tonnage melted will be materially increased within the next few weeks. Supplies, however, are quite large, and it is not expected that there will be any shortage. Prices remain fairly steady at a general range of \$8 to \$13 per gross ton. Cast-iron scrap is in active demand, and most offerings are readily disposed of at \$16 to \$18 per net ton for material of average quality.

New York

NEW YORK, June 21, 1916.

Pig Iron.—Considerable iron has been taken by the three large interests which were reported last week to be in the market for a total of 25,000 to 30,000 tons. The electric company which was inquiring for upwards of 10,000 tons for delivery in the last half for plants in New York State and Massachusetts is believed to have taken the greater portion of the foundry and malleable iron, besides 1000 tons of low phosphorus iron. Of the former 4000 tons was bought in the Central West. On some of the iron included in this purchase there was an option between second half and fourth quarter delivery. The railroad supply company which was buying for its Chicago district and New Jersey plants took 3500 tons of Southern iron for its Western foundry and a number of lots of high silicon iron, on which low prices were made, for its Eastern plant. A locomotive company's purchase amounted to 6000 tons of foundry iron, 1.75 per cent in silicon and upward, and 750 tons of basic iron. On the lower silicon iron it is understood that less than \$17.50 Buffalo was done on resale iron and that iron somewhat higher in silicon has gone at less than \$18 Buffalo furnace. A New York furnace and a Pennsylvania furnace shared in this business. A western New York coupler company is in the market for about 6000 tons of basic for summer delivery. In New England there is very little movement. Some iron is offered for sale there by a foundry interest which had bought for a new plant and has decided not to start up in view of the scarcity of molder's. Through New York offices sales of 4000 to 5000 tons of Bessemer iron have been made for export and considerable Bessemer iron has been sold for foreign delivery by eastern Pennsylvania furnaces. We quote at tidewater for early delivery: No. 1 foundry, \$20.50 to \$21; No. 2X, \$19.75 to \$20.25; No. 2 plain, \$19.50 to \$20; Southern iron at tidewater, \$20 to \$20.50 for No. 1 and \$19.50 to \$20 for No. 2 foundry and No. 2 soft.

Ferroalloys.—In the case of ferromanganese, sales are few and the market is lifeless. Consumers seem well covered and not inclined to purchase, with domestic production large and British arrivals in considerable volume. Spot alloy can probably be obtained as low as \$225, seaboard basis, with material for last quarter at \$200 and for 1917 at \$175. Sales of 2000 tons of spiegeleisen are reported, 1000 tons of which went at \$50, furnace, for delivery beginning the latter part of this year. Ferrosilicon, 50 per cent, is still in strong demand.

Structural Material.—The settlement of structural work proceeds slowly, with the result that fabricators are likely to stock up material being received under low-priced contracts. In one case the mill has been asked to slow up on shipments. There are, of course, only a few days left in which final specifications on expiring contracts may be made. Prices for plain material are firm but there is less range and 2.50c. to 2.75c. about measures the extremes for new buying for any delivery. Among the more active fabricated steel jobs which may be added to the list of work still under

consideration are the following: Loft at 403 East 104th Street for the 104th and 105th Street Corporation, 2000 tons; building for the Besse Clothing Store, Springfield, Mass., 800 tons; Levy Apartment, Park Avenue and Seventy-eighth Street, 600 tons; Paterno Apartment, West End Avenue and Seventy-fourth Street, 600 tons; apartment for Candler Holding Company, Edgecombe Avenue and 150th Street, 1200 tons; building at 228 West Seventy-first Street for the Gresham Realty Company, 800 tons; 1500 tons for the Packard Motor Car Company at Long Island City, and 400 tons for the New Haven, including 100 tons for the Central of New England at Poughkeepsie. The awards reported embrace 350 tons for the St. Thomas parochial school, Brooklyn, to Post & McCord; 350 tons for the Lehigh Valley at Sayre to the Pennsylvania Steel Company, which is also credited with the 1500 tons for the piershed at West Fifty-fifth Street, New York; 200 tons for the Remington Typewriter Building, Broadway, to Hay Foundry & Iron Works; 700 tons for the Lehigh at Waverly, N. Y., divided between the Pennsylvania Steel Company and the McClintic-Marshall Company; 200 tons for the Boston & Albany to the American Bridge Company; and 300 tons additional pier work, pier No. 21 East River to Milliken Brothers. We quote mill shipments at 2.669c. to 2.919c., New York, and from warehouse at 3.25c. to 3.50c., New York.

Steel Plates.—Besides the 10,000 tons placed last week for ship plates for Japan, at 4c. for fourth quarter of this year and first quarter of next, the buyer has an option for 15,000 tons and another Japanese shipping concern is inquiring for 10,000 tons. In marked contrast is the situation in universal plates. Deliveries in a few weeks are obtainable and a large lot could probably be placed at 3.50c., Pittsburgh, for open-hearth steel. In Bessemer steel, plates are quoted at 2.75c. and upward, the price depending on the attractiveness of the case, with delivery in about two months. So dull relatively is new building work that stocks in fabricators' yards are beginning to pile up. The chief event in car building is the placing of 900 cars for the Havana Central; three different builders participate. We quote mill shipments at 2.919c. to 4.169c., New York, the lower price for attractive lots of Bessemer plates for early shipment and for future shipments of open-hearth steel and the higher prices for early shipment of open-hearth plates. Lots from warehouse go at 4c. to 4.50c., New York.

Old Material.—Transactions are confined to small quantities and only a few classes of scrap. Steel scrap continues stagnant. Some little movement has taken place in wrought pipe and other rolling-mill stock, but practically nothing has been done in wrought scrap. Brokers quote buying prices about as follows to local dealers and producers, per gross ton, New York:

Heavy melting steel scrap (eastern Pennsylvania specifications)	\$12.25 to \$12.50
Old steel rails (short lengths) or equivalent	13.25 to 13.75
Relaying rails	28.00 to 30.00
Rerolling rails	15.50 to 16.00
Iron car axles	26.00 to 27.00
Steel car axles (for domestic use)	28.50 to 29.00
Steel car axles (for export)	30.00
No. 1 railroad wrought	18.50 to 19.00
Wrought-iron track scrap	15.50 to 16.00
No. 1 yard wrought, long	15.00 to 15.50
No. 1 yard wrought, short	12.25 to 12.50
Light iron (nominal)	5.00
Cast borings (clean)	8.00 to 8.25
Machine shop turnings (nominal)	6.25 to 6.50
Mixed borings and turnings	6.50 to 6.75
Wrought pipe	10.25 to 10.75
Old carwheels	15.00 to 15.50
Malleable cast (railroad)	12.25 to 12.75

Foundries have shown a little more interest in the market, but their purchases have not been large. Dealers' quotations to consumers on cast scrap are as follows, per gross ton, New York:

No. 1 cast (machinery)	\$16.50 to \$17.00
No. 2 cast (heavy)	15.00 to 15.50
Stove plate	12.00 to 12.50
Locomotive grate bars	12.00 to 12.50

Iron and Steel Bars.—Late war steel orders include 20,000 tons for 9.2-in. shell forgings, to be made by the Pressed Steel Car Company, and about 4000 tons for 12-in. shells to be made in this country for England. Generally there is not much color to the situation; a

few mills note slightly increased new domestic buying, and others emphasize an increased interest on the part of the foreign buyer. Holders of contracts have gotten around a disposition of some mills to resist the three and six-months options by getting extensions from month to month, so that the approaching close of a semi-annual period is not so noticeable in market quotations in normal times. For mill shipments of iron bars we quote 2.669c., New York, and for steel bars, 2.669c. to 3.169c., New York, according to the urgency of delivery, with 2.919c., New York, as the market for largest lots for prompt shipment. From warehouse we quote iron and steel bars at 3.10c. to 3.50c., New York.

Cast-Iron Pipe.—The volume of private buying continues well sustained, but public lettings are conspicuously absent. Municipalities seem to have about covered their requirements for this season. Prices are unchanged. Carload lots of 6-in., class B and heavier, are maintained at \$30.50 per net ton, class A and gas pipe taking an extra of \$1 per ton.

BRITISH STEEL MARKET

Pig Iron Very Scarce—American Billets Higher—The New Tungstenless Steel

LONDON, ENGLAND, June 21, 1916. (By Cable.)

The pig-iron scarcity is unrelieved and the embargo on exports continues. Cleveland shipments to Scotland are prohibited until the stocks of Scotch iron are exhausted. American billets for August delivery have sold at \$63 c.i.f. Tin plates are erratic and cheap second hand parcels are 36s. Ferromanganese is nominal at £35 upward.

A new tool steel is being produced in Sheffield without tungsten for which revolutionary claims are made. Quotations, mostly nominal, are as follows:

Tin plates, coke, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 36s. 6d.

Steel black sheets, No. 28, export, f.o.b. Liverpool, £20 5s.

Steel ship plates, Scotch, delivered local yards, £13 17s. 6d.

Steel rails, export, f.o.b. works port, £10 17s. 6d.

Hematite pig iron, f.o.b. Tees, about 140s.

Sheet bars (Welsh) delivered at works in Swansea Valley, £14 5s. against £14 nominal, last week.

Steel bars, export, f.o.b. Clyde, £18 5s.

Ferromanganese, £35 nominal.

Ferrosilicon, 50 per cent, c.i.f., £29.

(By Mail)

Demand for Munitions Dominates the Entire Trade—Iron and Steel Scarce

LONDON, ENGLAND, May 30, 1916.

The outlook in the iron industry continues to afford considerable anxiety owing to short supplies. The chief factor of course is the feverish activity in turning out munitions, while great efforts are put forth to make provision as far as possible for the urgent needs of our Allies. The severe export restrictions which have been in force for some time are now perhaps beginning to have a little effect in enabling the execution of old orders on home account to proceed somewhat more freely, but the scarcity of raw material and labor is as marked as ever. It is obvious, therefore, that the tendency of prices continues very strong.

A limited business has recently been done in Cleveland pig iron for export, but so far only few licenses are obtainable even for France, although shipments against old contracts have been of respectable proportions. There is, however, a more hopeful feeling that some relief is near at hand, since it is understood that, under government assistance in the way of labor, several additional furnaces will be blown in at an early date. Meanwhile the position remains extremely tight. The view is expressed that business with the Allies will be resumed on a satisfactory scale, and possibly to a slight extent with neutrals. In hematite shipments are very difficult, but in another month or so the tightness may relax. There is a brisk demand

for ore, and coke is strong and scarce, while freights have hardened.

The demand for ferromanganese is not quite so brisk as it has been, but the tone continues strong, British producers having placed practically the whole of their output for this year. Export prices now vary from about £37 to £45, on the basis of free on board ship.

Conditions in semi-finished steel have tightened further, with an insatiable demand and virtually nothing offered from home makers. Sheet bars are practically unobtainable almost at any price. Importations of American steel continue difficult, buyers being somewhat reluctant to pay the terms exacted on the basis of upward of \$63, at which figure some business has been done latterly, c.i.f. Liverpool, for June shipment.

The trend of prices for finished products is decidedly upward, with an unabated demand for bars, export business here having been much curtailed. Only limited quantities are allowed to be shipped to allied countries. Steel works are operating at great pressure on munition orders.

Germany's Finished Steel Output in 1915

Germany's rolling mills in 1915 produced 11,243,360 metric tons against 13,165,589 tons in 1914 and 16,698,950 tons in 1913. The output of various products, divided into pre-war and war periods for comparison, is given in metric tons as follows by the German Association of Iron and Steel Producers:

Descriptions	1914		1915	
	Jan.- July	Aug.- Dec.	Jan.- July	Aug.- Dec.
Semi-finished for sale.	1,593,984	435,296	911,934	730,017
Railroad materials...	1,274,375	592,711	868,794	555,754
Shapes	946,852	245,394	487,170	279,483
Bars	2,638,139	898,762	1,491,168	1,479,517
Hoops	277,124	91,790	149,885	115,254
Wire rods	707,594	219,438	388,374	362,560
Plates	817,468	355,498	548,020	418,878
Sheets	528,692	210,118	352,671	276,024
Timplates	51,333	34,236	52,444	40,307
Tubes	454,927	155,712	255,778	204,987
Rolling stock	199,000	78,048	112,304	79,776
Forgings	122,488	72,637	126,512	110,168
Other manufactures...	38,413	75,565	226,603	260,978
Total	9,700,389	3,465,200	6,329,657	4,913,703
1913 total...				16,898,950
1914 total...				13,165,589
1915 total...				11,243,360

The average monthly production in the 7 peace months of 1914, January-July, was 1,385,770 tons against 904,237 tons for the same period in 1915, or about 65 per cent of the peace output. On the other hand, the average production of 693,040 tons from August to December, 1914, compares with an average of 982,741 tons per month in the same 5-month period in 1915, an increase of about 42 per cent and about 71 per cent of the average peace output.

Ferrovanadium Exports Increasing

Ferrovanadium exports were the largest in March on record, having been 138,718 lb., or nearly double the monthly export rate for 1915, the record year. Government data show the following as recent ferrovanadium exports in pounds:

	January, 1916.....	44,782	Per Month
February, 1916.....		63,065	
March, 1916.....		138,718	
1915	840,265	70,022	
1914	770,079	64,173	
1913	604,287	50,351	

The rate to April 1, 1916, of 82,188 lb. per month is at the rate of 986,256 lb. per year—a large increase over that for 1915, the record year.

Germany's April Pig-Iron Output

German pig-iron production for April was 1,073,706 metric tons, or 35,790 tons per day, which compares with 1,114,194 tons in March, or 35,942 tons per day—the war record. The April output was made up as follows: Foundry iron, 165,885 tons; Bessemer iron, 13,864 tons; Thomas or basic iron, 687,689 tons; steel-making iron and spiegeleisen, 187,704 tons, and forge or puddle iron, 18,564 tons.

Iron and Industrial Stocks

NEW YORK, June 21, 1916.

A sharp check has been administered to the upward tendency of stocks by the development of grave troubles with Mexico. On Monday of this week prices of some stocks declined heavily. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Allis-Chal., com.	25 - 26 1/2	Ry. Steel Spring, pref.	96 1/2 - 97 1/2
Allis-Chal., pref.	82 - 83	Republic, com.	45 1/2 - 48 1/2
Am. Can., com.	54 1/2 - 58 1/2	Republic, pref.	107 - 111 1/2
Am. Can., pref.	109 1/2 - 111 1/2	Sloss, com.	53
Am. Can. & Fdy., com.	56 1/2 - 61	Pipe, com.	21 1/2 - 23 1/2
Am. Loco., com.	68 1/2 - 73 1/2	Pipe, pref.	53 - 54 1/2
Am. Loco., pref.	102 1/2 - 103 1/2	U. S. Steel, com.	83 1/2 - 86 1/2
Am. Steel Fdries, com.	49 1/2 - 51 1/2	U. S. Steel, pref.	117 - 118 1/2
Bald. Loco., com.	84 1/2 - 90 1/2	Va. I. C. & Coke, com.	50
Bald. Loco., pref.	104 - 105 1/2	Westing. Elec., com.	58 1/2 - 62 1/2
Beth. Steel, com.	435 - 444	Am. Rad., com.	135
Colorado Fuel, com.	40 1/2 - 44 1/2	Am. Rad., pref.	395
Deere & Co., pref.	91 1/2 - 92 1/2	Am. Ship, com.	44 - 45
Gen. Electric, com.	167 1/2 - 171 1/2	Am. Ship, pref.	90
Gt. No. Ore Cert, com.	36 1/2 - 38 1/2	Chic. Pneu. Tool, com.	73 1/2
Int. Harv. of N. J., com.	113 1/2 - 118	Cambr. Steel, com.	83 1/2
Int. Harv. Corp., com.	81 - 82 1/2	Lake Sup. Corp., com.	12
Int. Harv. Corp., pref.	109	Pa. Steel, pref.	98
Lacka. Steel, com.	69 - 71 1/2	Warwick, com.	9 1/2 - 9 1/2
Nat. En. & Stm., com.	23 1/2 - 24 1/2	Cruc. Steel, com.	87 1/2
N. Y. Air Brake, com.	132 - 140	Cruc. Steel, pref.	119 1/2
Pitts. Steel, pref.	97	Harb.-Walk. Refrac., com.	90
Pressed Stl., com.	47 - 51 1/2	Harb.-Walk. Refrac., pref.	102 1/2
Pressed Stl., pref.	100 1/2 - 100 1/2	La Belle Iron, com.	50 1/2 - 51
Ry. Steel Spring, com.	43 1/2 - 46 1/2	Driggs-Seabury, com.	129 - 135

Dividends

The Sloss-Sheffield Steel & Iron Company, regular quarterly, 1 1/4 per cent on the preferred stock, payable July 1.

The J. I. Case Threshing Machine Company, quarterly, 1 1/4 per cent on the preferred stock, payable July 1.

The International Harvester Company of New Jersey, regular quarterly, 1 1/4 per cent on the common stock, payable July 15.

The American Brake Shoe & Foundry Company, regular quarterly, 2 per cent on the preferred and 1 1/4 per cent on the common stock, payable June 30.

The Gulf States Steel Company, initial dividend of 1 1/2 per cent on the second preferred stock, payable August 1.

The Willys-Overland Company, regular quarterly, 1 1/4 per cent on the preferred stock, payable July 1.

The Otis Elevator Company, regular quarterly, 1 1/2 per cent on the preferred and 1 1/4 per cent on the common stock, payable July 15.

The Crucible Steel Company of America, regular quarterly, 1 1/4 per cent on the preferred stock and extra of 1/4 of 1 per cent to apply on back dividends, payable June 30.

The Packard Motor Car Company, 50 per cent stock dividend on the common stock, payable August 1.

The L. S. Starrett Company, regular semi-annual, 3 per cent on the preferred stock and semi-annual 6 per cent on the common stock, both payable June 20. Six months ago 3 per cent was declared on the common stock.

The Hupp Motor Company, regular quarterly, 1 1/4 per cent on the preferred stock, payable July 1.

The E. W. Bliss Company, regular quarterly, 2 per cent on the preferred stock and 1 1/4 per cent on the common stock and an extra of 11 1/2 per cent on the common stock, all payable July 1.

The Union Twist Drill Company, regular semi-annual, 3 per cent and an extra of 3 per cent on the common stock, payable July 1.

The Empire Steel & Iron Company, regular quarterly, 3 per cent on the preferred stock, payable July 1.

The United Shoe Machinery Corporation, regular quarterly, 1 1/2 per cent on the preferred stock and 2 per cent and an extra of 6 per cent on the common stock, payable July 5.

The Youngstown Sheet & Tube Company, regular quarterly, 1 1/4 per cent on the preferred stock and 2 per cent on the common stock, payable July 1.

The Brier Hill Steel Company, regular quarterly, 1 1/4 per cent on the preferred stock, and 1 1/2 per cent on the common stock, payable July 1.

The Trumbull Steel Company, regular quarterly, 1 1/4 per cent on the preferred stock, and 1 1/2 per cent on the common stock, payable July 1.

The Union Switch & Signal Company, regular quarterly, \$1.50 per share each on the common and preferred stocks, payable July 15.

The Sharon Steel Hoop Company, regular quarterly, 1 1/4 per cent, payable June 30.

The Elyria Iron & Steel Company, regular quarterly, 1 1/4 per cent, payable July 1.

Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, effective from April 10, 1916, per 100 lb.: New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30.7c.; Birmingham, Ala., 45c.; Pacific coast (by rail only), 65c.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, $\frac{1}{4}$ in. thick and over, and zees 3 in. and over, 2.50c. to 2.75c. Extras on other shapes and sizes are as follows:

Cents per lb.

I-beams over 15 in.	.10
H-beams over 18 in.	.10
Angles over 6 in., on one or both legs.	.10
Angles, 3 in. on one or both legs less than $\frac{1}{4}$ in. thick, as per steel bar card, Sept. 1, 1909.	.70
Tees, structural sizes (except elevator, handrail, car truck and conductor rail).	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909.	.20 to .80
Deck beams and bulb angles.	.30
Handrail tees.	.75
Cutting to lengths, under 3 ft. to 2 ft. inclusive.	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive.	.50
Cutting to lengths, under 1 ft.	.155
No charge for cutting to lengths 3 ft. and over.	

Plates.—Tank plates, $\frac{1}{4}$ in. thick, 6 in. up to 100 in. wide, 2.90c. to 4c., base, net cash, 30 days, or $\frac{1}{2}$ of 1 per cent discount in 10 days, carload lots. Extras are:

Quality Extras

Cents per lb.

Tank steel	Base
Pressing steel (not flange steel for boilers)	.10
Boiler and flange steel plates.	.15
"A. M. A." and ordinary firebox steel plates.	.20
Still bottom steel	.30
Locomotive firebox steel.	.50
Marine steel, special extras and prices on application.	

Gage Extras

Rectangular, $\frac{1}{4}$ in. thick, over 6 in. wide to 100 in. wide..	Base
Lighter than $\frac{1}{4}$ in., to $\frac{3}{16}$ in., up to 72 in. wide.	.10
*Lighter than $\frac{1}{4}$ in., including $\frac{3}{16}$ in., over 72 in. to 84	.20
*Lighter than $\frac{1}{4}$ in., including $\frac{3}{16}$ in., over 84 in. to 96	.30
*Lighter than $\frac{1}{4}$ in., including $\frac{3}{16}$ in., over 96 in. to 100	.40
*Lighter than $\frac{1}{4}$ in., including $\frac{3}{16}$ in., over 100 in. to 102	.45
Lighter than $\frac{3}{16}$ in., including No. 8, up to 72 in. wide	.15
*Lighter than $\frac{3}{16}$ in., including No. 8, over 72 in. to 84	.25
*Lighter than $\frac{3}{16}$ in., including No. 8, over 84 in. to 96	.35
Lighter than No. 8, including No. 10, up to 60 in. wide.	.30
Lighter than No. 8, including No. 10, over 60 in. to 64..	.35
Up to 72 in., not less than 10.2 lb. per sq. ft. will be considered $\frac{1}{4}$ in.	
Over 72 in. must be ordered $\frac{1}{4}$ in. thick on edge, or not less than 11 lb. per sq. ft. to take base price.	
Over 72 in. wide, ordered less than 11 lb. per sq. ft., down to weight of $\frac{3}{16}$ in., take price of $\frac{3}{16}$ in.	
Over 72 in., ordered weight $\frac{3}{16}$ in., take No. 8 price.	
Over 72 in., ordered weight No. 8, take No. 10 price.	

Width Extras

Over 100 in. to 110 in. inclusive	.05
Over 110 in. to 115 in. inclusive	.10
Over 115 in. to 120 in. inclusive	.15
Over 120 in. to 125 in. inclusive	.25
Over 125 in. to 130 in. inclusive	.50
Over 130 in.	1.00

Length Extras

Universal plates 80 ft. long up to 90 ft. long	.05
Universal plates 90 ft. long up to 100 ft. long	.10
Universal plates 100 ft. long up to 110 ft. long	.20

Cutting Extras

No charge for rectangular plates to lengths 3 ft. and over.	
Lengths under 3 ft. to 2 ft. inclusive.	.25
Lengths under 2 ft. to 1 ft. inclusive.	.50
Lengths under 1 ft.	1.55
Circles 3 ft. in diameter to 100 in.	.30
Circles over 100 to 110 in. (width extra)	.35
Circles over 110 to 115 in. (width extra)	.40
Circles over 115 to 120 in. (width extra)	.45
Circles over 120 to 125 in. (width extra)	.55
Circles over 125 to 130 in. (width extra)	.80
Circles over 130 in. (width extra)	1.30
Circles under 3 ft. to 2 ft. inclusive.	.55
Circles under 2 ft. to 1 ft. inclusive.	.80
Circles under 1 ft.	1.85
Half circles take circle extras.	
Sketches, not over four straight cuts, inc. straight taper	.10
Sketches having more than four straight cuts	.20
Plates sheared to a radius take complete circle extras.	

*Including extra for width.

Wire Rods.—Including chain rods, \$55.

Wire Products.—Prices to jobbers, effective May 1: Fence wire, Nos. 6 to 9, per 100 lb., terms 60 days or 2 per cent discount in 10 days, carload lots, annealed, \$2.45; galvanized, \$3.15. Galvanized barb wire and staples, \$3.35; painted, \$2.65. Wire nails, \$2.50 to \$2.60. Galvanized nails, 1 in. and longer, \$2 advance over base price; shorter than 1 in., \$2.50 advance over base price. Cement-coated nails, \$2.50. Woven wire fencing, 61 $\frac{1}{2}$ per cent off list for carloads, 60 $\frac{1}{2}$ off for 1000-rod lots, 59 $\frac{1}{2}$ off for less than 1000-rod lots.

The following table gives the price per 100 lb. to retail merchants on fence wire in less than carloads, with the extras added to the base price:

Plain Wire, per 100 lb.									
Nos.	6 to 9	10	11	12 & 12 $\frac{1}{2}$	13	14	15	16	
Annealed	\$2.50	\$2.55	\$2.60	\$2.65	\$2.75	\$2.85	\$2.95	\$3.05	
Galvanized	3.20	3.25	3.30	3.35	3.45	3.55	4.00	4.10	

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card in effect from April 21, 1916, all full weight pipe:

Butt Weld			Iron		
Steel	Black	Galv.	Steel	Black	Galv.
$\frac{1}{8}$, $\frac{1}{4}$ and $\frac{3}{8}$...	63	30 $\frac{1}{2}$	$\frac{1}{8}$ and $\frac{1}{4}$...	52	19
$\frac{1}{2}$...	67	46 $\frac{1}{2}$	$\frac{1}{2}$...	53	20
$\frac{3}{4}$ to 3...	70	50 $\frac{1}{2}$	$\frac{1}{2}$...	57	33
			$\frac{1}{4}$ to 1 $\frac{1}{2}$...	60	38

Lap Weld					
2	65	45 $\frac{1}{2}$	1 $\frac{1}{4}$...	48	26
2 $\frac{1}{2}$ to 6	68	48 $\frac{1}{2}$	1 $\frac{1}{2}$...	54	33
7 to 12	65	44 $\frac{1}{2}$	2...	55	34
13 and 14	53 $\frac{1}{2}$	...	2 $\frac{1}{2}$ to 4...	57	37
15	51	...	4 $\frac{1}{2}$ to 6...	57	37
			7 to 12...	56	36

Reamed and Drifted					
1 to 3, butt	68	48 $\frac{1}{2}$	$\frac{1}{4}$ to 1 $\frac{1}{2}$, butt	55	32
2, lap	63	43 $\frac{1}{2}$	1 $\frac{1}{4}$, lap	43	20
2 $\frac{1}{2}$ to 6, lap	66	46 $\frac{1}{2}$	1 $\frac{1}{2}$, lap	49	27
2 to 3	69	50 $\frac{1}{2}$	2 $\frac{1}{2}$, lap	50	28

Butt Weld, extra strong, plain ends					
$\frac{1}{8}$, $\frac{1}{4}$ and $\frac{3}{8}$...	59	35 $\frac{1}{2}$	$\frac{1}{8}$, $\frac{1}{4}$ and $\frac{3}{8}$...	52	29
$\frac{1}{2}$	64	45 $\frac{1}{2}$	$\frac{1}{2}$...	57	38
$\frac{3}{4}$ to 1 $\frac{1}{2}$	68	49 $\frac{1}{2}$	$\frac{1}{2}$ to 1 $\frac{1}{2}$...	61	40
2 to 3	69	50 $\frac{1}{2}$			

Lap Weld, extra strong, plain ends					
2	63	44 $\frac{1}{2}$	1 $\frac{1}{4}$...	50	28
2 $\frac{1}{2}$ to 4	66	47 $\frac{1}{2}$	1 $\frac{1}{2}$...	55	34
4 $\frac{1}{2}$ to 6	65	46 $\frac{1}{2}$	2...	57	37
7 to 8	61	40 $\frac{1}{2}$	2 $\frac{1}{2}$ to 4...	59	40
9 to 12	56	35 $\frac{1}{2}$	4 $\frac{1}{2}$ to 6...	58	39
			7 to 8...	52	33
			9 to 12...	47	28

To the large jobbing trade an additional 5 per cent is allowed over the above discounts.

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Sheets.—Makers' prices for mill shipments on sheets, of U. S. standard gage, in carload and larger lots, are as follows, 30 days net, or 2 per cent discount in 10 days:

Blue Annealed Sheets

	Cents per lb.
Nos. 3 to 8	.295 to .320
Nos. 9 to 10	.300 to .325
Nos. 11 and 12	.305 to .330
Nos. 13 and 14	.310 to .335
Nos. 15 and 16	.320 to .345

Box Annealed Sheets, Cold Rolled

Nos. 17 to 21	.270 to .280
Nos. 22 and 24	.275 to .285
Nos. 25 and 26	.280 to .295
No. 27	.285 to .295
No. 28	.290 to .300
No. 29	.295 to .305
No. 30	.315 to .325

Galvanized Sheets of Black Sheet Gage

Nos. 10 and 11	.360 to .375
No. 12	.370 to .385
Nos. 13 and 14	.370 to .385
Nos. 15 and 16	.380 to .395
Nos. 17 to 21	.395 to .410
Nos. 22 and 24	.405 to .420
Nos. 25 and 26	.420 to .435
No. 27	.445 to .460
No. 28	.460 to .475
No. 29	.475 to .490

Boiler Tubes.—Discounts on less than carloads, freight to destination added, effective from April 15, 1916, are as follows:

Lap Welded Steel			Standard Charcoal Iron		
1 $\frac{1}{2}$ in.	35	1 $\frac{1}{2}$ in.	39		
1 $\frac{3}{4}$ and 2 in.	47	1 $\frac{1}{4}$ and 2 in.	36		
2 $\frac{1}{2}$ in.	44	2 $\frac{1}{4}$ in.			
2 $\frac{1}{2}$ and					

Metal Markets

The Week's Prices

Cents Per Pound for Early Delivery									
Copper, New York		Tin, Electro-		Lead		Spelter			
June	Lake	lytic	New	New	St.	New	St.		
14.	27.75	27.62½	43.00	6.75	6.55	13.25	13.00		
15.	27.75	27.50	42.50	6.75	6.55	13.25	13.00		
16.	27.75	27.37½	41.75	6.75	6.55	13.00	12.75		
17.	27.75	27.25	41.00	6.75	6.55	13.00	12.75		
18.	27.75	27.12½	40.75	6.62½	6.45	12.75	12.50		
20.	27.75	27.00	40.75	6.62½	6.45	12.50	12.25		

NEW YORK, June 21, 1916.

With the exception of aluminum, all the metals are dull and lower. Some first hands are now making concessions in copper. Weakness abroad hurts tin. In lead there is some export inquiry but few sales. No interest is shown in spelter. Antimony is falling fast.

New York

Copper.—For some time second hands have been making the market, but there is now seen a tendency on the part of certain producers to lower their prices. Except for a few straggling inquiries calling for small lots and odd shapes for rolling, the market has continued dormant. It is believed that second hands have taken what little business has been done. Nearby electrolytic can be had easily at 27c., cash, New York, and it is considered probable that less than this figure might be accepted. Lake copper is purely nominal at 27.75c., cash, New York. The Mexican situation is being considered by the trade, but so far the market has not been affected to any noticeable degree, although it is realized that two or three mines might have to suspend operations unless afforded military protection. The London market for electrolytic continues to grow weaker and the quotation yesterday was £138. The exports this month, including yesterday, total 23,917 tons.

Tin.—The only business since the last report occurred on Friday and Saturday when about 150 tons changed hands at 41c. on the two days. Otherwise buyers have shown no interest. They are apparently dominated by a feeling that there are occurrences in the Far East and at London of which they are not fully apprised. It is believed, for one thing, that the June shipments from the Straits will be very large. Weakness exists in London also, the spot quotation for Straits having dropped £4 to £174 to-day. The dullness in the tin market has now lasted about seven weeks, and it is not probable that there will be much doing until the market steadies itself. The New York quotation yesterday was 40.75c. The arrivals this month total 3350 tons and there is afloat 3877 tons.

Lead.—In the past week there has been a slight revival of export inquiry, which has made sellers a little more optimistic, especially in view of the Mexican situation, but it cannot be learned that much business resulted. The chief trouble with the market is the lack of new war orders. The New York quotation yesterday was 6.62½c. so far as independent sellers were concerned, with the leading interest still asking 7c. The St. Louis quotation of the independents was 6.45c., with the leading producer asking 6.92½c. Sellers are in a comfortable position, but at prevailing prices are very willing to take on more business. The exports this month, including yesterday, total 1798 tons.

Spelter.—Prompt metal was sold yesterday at 12.50c., New York, or 12.25c., St. Louis. The demand is next to nothing, with futures, in particular, neglected. July is quoted at about 12c., August at 11.75c. and September about 11.25c., New York. The lower cost of spelter has brought the price of sheet zinc down to 20c., f.o.b. mill, carload lots.

Antimony.—The market is stagnant, and nominal prices are much lower, but still fail to incite interest on the part of consumers. Chinese and Japanese grades can be had at from 18c. to 18.50c.

Aluminum.—This metal is stronger at 63c. to 65c.

for No. 1 virgin aluminum, 98 to 99 per cent pure, it is reported, because of good buying on the part of Russia and Italy.

Old Metals.—The downward tendency continues. Dealers' selling prices are as follows:

	Cents per lb.
Copper, heavy and crucible	24.50 to 25.50
Copper, heavy and wire	24.00 to 25.00
Copper, light and bottoms	19.00 to 20.00
Brass, heavy	14.00 to 14.50
Brass, light	11.25 to 11.75
Heavy machine compositions	18.00 to 18.50
No. 1 yellow rod brass turnings	14.00 to 14.50
No. 1 red brass or composition turnings	14.50 to 15.50
Lead, heavy	6.00
Lead, tea	5.50
Zinc	9.50 to 10.50

Chicago

JUNE 19.—Weakness in the prices of metals has been general, and especially pronounced with respect to tin. Resales of copper have had an adverse influence on the market. Lower prices for spelter are continually appearing. We quote: Casting copper, 26c.; Lake copper, 28.25c.; tin, carloads, 43c., and small lots, 45c.; lead, 6.75c.; spelter, 18c.; sheet zinc, 21c.; Cookson's antimony, 50c.; other grades, 23.50c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 20.50c.; copper bottoms, 18.50c.; copper clips, 20c.; red brass, 17c.; yellow brass, 12.50c.; lead pipe, 5.50c.; zinc, 10c.; pewter, No. 1, 27c.; tinfoil, 33c.; block tin pipe, 37c.

St. Louis

JUNE 19.—Quiet has ruled for the greater part of the past week in the non-ferrous metal market, with the close to-day as follows: Lead, 6.75c. to 6.92½c., the latter the asking price; spelter, 12.50c. for June delivery and 12c. to 12.25c. for July; tin, 43c.; Lake copper, 28c.; electrolytic copper, 27.75c.; antimony, Asiatic, 23c. In the Joplin district ore prices were somewhat weaker, the basis range for 60 per cent being from \$90 down to \$60 per ton for second and lower grades, and the best settlement on premium ores \$93. The week's average for the district's sales was \$75.30. Calamine ranged from \$45 to \$60, with the average for the week's sales \$55. Lead ore dropped to \$80 for the best grades after an early but slight advance, and the average price for the week was \$79. On miscellaneous scrap metals we quote dealers' buying prices as follows: Light brass, 9.50c.; heavy yellow brass, 12.50c.; heavy red brass and light copper, 16c.; heavy copper and copper wire, 19c.; zinc, 8.50c.; lead, 5c.; tea lead, 4c.; pewter, 25c.; tinfoil, 35c.

Lake Superior Miners' Strike

ISHPEMING, MICH., June 21, 1916.—(By Telegraph.)—Wage advances at Lake Superior ore mines were general, following the Steel Corporation's last raise. The average was about 8 per cent. Raises were made in February and again in May. No shortage of labor is reported. A strike is in progress on the eastern part of the Mesaba range. All underground mines in Aurora and Biwabik are closed and many in Virginia, Gilbert and Eveleth are idle or working with short crews. The trouble was started by agitators of Industrial Workers of the World who demand that the contract system of pay be abolished and flat wages established. Companies will not accede to the demands. Steel Corporation officials state that if the miners do not return to work they will close all of their underground mines in the Virginia district. This would throw thousands out of employment. It is feared that the strike will spread to Hibbing and the remainder of the Mesaba districts. No disturbances have occurred thus far.

The Phillips Sheet & Tin Plate Company will add a 10-in. mill to its plant at Weirton, W. Va., to roll hoops and bands.

PERSONAL

Ira N. Hollis, president Worcester Polytechnic Institute, Worcester, Mass., has been nominated for president of the American Society of Mechanical Engineers for the year beginning with the annual meeting in December. The nominations for the three vice-presidents, who serve for two years, are: Prof. Charles H. Benjamin, Purdue University, Lafayette, Ind.; Prof. Arthur M. Greene, Jr., Rensselaer Polytechnic Institute, Troy, N. Y., now serving his second year as manager, and Charles T. Plunkett, president Berkshire Cotton Mfg. Company, Adams, Mass. The three nominations for managers are: Prof. Robert H. Fernald, University of Pennsylvania; Prof. William B. Gregory, Tulane University, New Orleans, and C. R. Weymouth, Charles C. Moore & Co., San Francisco. Major William H. Wiley, who has been treasurer since 1884, has been re-nominated.

H. C. Crawford has been made traffic manager of the Midvale Steel Company, Cambria Steel Company and Worth Brothers Company, and has full charge of all traffic matters for those companies, dating from June 15, with headquarters in the Widener Building, Philadelphia.

J. F. MacEnulty, vice-president Pressed Steel Car Company, has left this country with his family for an extended trip abroad and is now in Petrograd, Russia.

H. J. McQuade, purchasing agent of the Lehigh Coal Company, has been appointed purchasing agent of the Lehigh Valley Railroad.

John F. Tinsley, superintendent of the South works, Worcester, Mass., of the American Steel & Wire Company, has resigned to become assistant general superintendent of the Crompton & Knowles Loom Works, Worcester. He will be succeeded by John Wheeldon, superintendent of the Cuyahoga works of the American Steel & Wire Company, Cleveland, Ohio. Mr. Wheeldon, before going to Cleveland, was superintendent of the North works of the same company in Worcester.

D. A. Urquart, formerly foreman of the screw machine department of the Brown & Sharpe Mfg. Company, Providence, R. I., has been made superintendent of the Union Twist Drill Company, Athol, Mass., succeeding Archibald N. Goddard, who recently resigned to take a position in Detroit.

Frederick E. Wells, of the F. E. Wells & Sons Company, Greenfield, Mass., has disposed of a controlling interest but retains substantial holdings in the company. He has been active in the company 50 years, and his retirement brings about several changes. At the annual meeting on June 16, Frank O. Wells was elected president; Frederick H. Payne, vice-president; Frank A. Yeaw, treasurer; and these, with William M. Pratt and Fred W. Wells, directors.

William H. Warren has been appointed general manager of works of the Brier Hill Steel Company at Youngstown, Ohio, and George F. Alderdice has been made vice-president of the same company, succeeding Rollin C. Steese, who formerly held both positions. Before going with the Brier Hill Steel Company, Mr. Alderdice was assistant manager of sales of the Republic Iron & Steel Company at Youngstown.

Glenn A. Aiken, traffic manager of the American Bolt & Nut Fastener Company, Pittsburgh, has been elected first vice-president of the Traffic Club of Pittsburgh. Albert C. Graham, traffic manager of the Youngstown Sheet & Tube Company, Youngstown, Ohio, has been elected third vice-president.

Horton Penrose, manager of the Pittsburgh office of Shimer & Co., Inc., Philadelphia, has returned from a business trip to California.

W. C. Bulmer has been appointed to succeed L. M. McDonald as superintendent of the open-hearth and Bessemer departments of the Ohio works of the Carnegie Steel Company at Youngstown, Ohio. Jacob A.

Reisinger has been appointed assistant to Mr. Bulmer in charge of the open-hearth and Bessemer departments.

E. d'Esme, who has been in this country several weeks in the interest of the French Government, inspecting the manufacture of war munitions, expects to remain here about three months. His present headquarters are at the offices of Schneider & Co., 44 Whitehall Street, New York City.

Charles E. Carpenter, Allied Machinery Company of America, has returned to Europe.

William H. Lolley, formerly connected with the Simms Magneto Company and the Remy Electric Company, has joined the selling force of the Timken Roller Bearing Company, Canton, Ohio, and will represent that company throughout the East.

W. E. Tretheway, president and general manager of the Stockton Iron Works, Stockton, Cal., has disposed of his interest and retired from the company.

C. J. Kirk, president United States Sherardizing Company, New Castle, Pa., has returned from California, where he spent the winter.

George T. Snyder, formerly chief engineer at the National works of the National Tube Company, McKeesport, Pa., has been transferred to a similar position at the Lorain works of the company at Lorain, Ohio. A. L. Hoerr has been appointed chief engineer at the National works to succeed Mr. Snyder. F. W. Waterman, formerly chief engineer at the Lorain works, has been appointed manager of the new tube mills now being built by the Gary Tube Company, Gary, Ind.

Allen L. Wetmore has opened an office at 202 Balboa Building, San Francisco, as manufacturers' agent, handling railroad supplies, foundry supplies and other heavy lines. He is a son of W. A. Wetmore, California agent for the Colorado Fuel & Iron Company.

Changes in Pusey & Jones Management

The Pusey & Jones Company, Wilmington, Del., reports the following changes in its organization: The resignations of Stirling H. Thomas as president, Elbert H. Neese as vice-president and sales manager, and John M. Mendenhall as vice-president and works manager have been tendered and accepted. In their places have been elected the following: Christoffer Hannevig, 78 Broad Street, New York, president; Ralph James M. Bullowa, 10 Broadway, New York, secretary; Henry Lysholm, Philadelphia, vice-president; H. E. Norbom, Philadelphia, treasurer, and C. Stewart Lee, assistant to president.

Definite plans have been prepared, and are now being put into effect, to enlarge greatly the shipbuilding facilities of the company, and contracts for a number of vessels, which will be built on new ways, have been closed. Other plant enlargements are contemplated, and the new management expects to go ahead rapidly with the improvement of the shop facilities.

Railway Supply Manufacturers Elect Officers

At the annual meeting of the Railway Supply Manufacturers' Association, Atlantic City, N. J., June 17, Edmund H. Walker, Standard Coupler Company, was elected president for the ensuing year, Le Grand Parish, American Arch Company, was made vice-president, and the following were elected as new members of the executive committee: Second district, Charles W. Beaver, Yale & Towne Mfg. Company, and Harrison G. Thompson, Edison Storage Battery Company; third district, William McConway, Jr., McConway & Torley Company; fourth district, George A. Cooper, Frost Railway Supply Company; fifth district, George R. Carr, Dearborn Chemical Company.

Reports from Bilbao, Spain, are that the high price and scarcity of coal are causing great inconvenience to the iron and steel industry of that country. The lack of fuel is so serious in the case of the Sociedad Nueva Montana de Sauta de Sauta that unless relief comes quickly some of the blast furnaces may have to shut down.

High Speed Steels Without Tungsten

A new tool steel, claimed to be a substitute for high speed steel, has been brought out in England by Darwin & Milner of Sheffield. It was publicly demonstrated on May 18, and is announced as an alloy steel containing neither tungsten, molybdenum, cobalt nor vanadium, but having excellent high speed qualities. It is the result of extensive experiments to find a substitute for tungsten high speed steel. British trade papers state that the new alloy is composed entirely of materials freely obtainable. The discovery has now been developed and the steel will soon be put on the market.

A feature of its manufacture is that it is cast in square, flat or other shaped bars, either in iron or sand molds, and it is claimed that, without forging or hardening or heat treatment of any kind, it possesses the correct tool-hardness, with excellent so-called "hot-cutting" qualities. After it is cast, it is ground to shape and is then ready for use as a turning, planing or slotting tool. The London *Iron and Coal Trades Review* describes the recent public trial as follows:

The material was ground up into tools and the tools tested in comparison with high-speed steel. They were made from 1 1/4-in. square tool lengths. The ends of the cast bars were ground up on a Gisholt oscillating grinder, the grinding into shape only requiring about a quarter of an hour for each tool length. Turning tests were made on a heavy 36-hp. direct-driven high-speed testing lathe. The material upon which the tools were tested was a round ingot of high tensile motor-part steel, containing 0.32 per cent carbon, 0.07 per silicon, 0.59 per cent manganese, 0.024 per cent sulphur, 0.012 per cent phosphorus, 1.26 per cent chromium, and 3.28 per cent nickel. The tools were tested both with very heavy cuts reducing the bar 1/2 in. at speeds of about 50 ft., and light cuts reducing the bar 1/32 in., attaining a speed of 150 ft. Tools of the same alloy 1/4 in., 1/2 in. up to 2 in. square were tested on the same bar and all proved successful, possessing good red hardness and cutting quite clearly.

The London *Ironmonger* states that since the demonstration was given further tests have been made which raise the efficiency factor to about twice that of super-high speed steel.

A TUNGSTENLESS GERMAN STEEL

A new high-speed steel of the highest power and efficiency and containing no tungsten is reported to have been produced recently in Germany by the Richard Lindenberg Steel Works at Remscheid. It is stated to be entirely based on raw materials available only in Germany and from which tungsten is excluded. Experiments resulting in the invention date back a considerable time. The same company about a year ago claimed to have made successfully a steel without nickel for protective shields, equal to special nickel steel. Extensive experiments to lessen Germany's need of nickel are expected to be successful.

Eliminating Reduction of Area

A rule eliminating the reduction of area item from steel boiler plate specifications, pending an investigation by the U. S. Bureau of Standards, has been adopted by the executive committee of the Board of Supervising Inspectors of the U. S. Steamboat Inspection Service. It was approved by the Secretary of Commerce on June 7, 1916. The paragraph as amended reads as follows:

When the tensile strength determined by the test is less than 63,000 lb. per sq. in. the minimum elongation shall be 25 per cent for plates 3/4 in. and under in thickness and 22 per cent for plates over 3/4 in. in thickness. The quench-bend specimen shall bend through 180 deg. around a curve the radius of which is three-fourths the thickness of the specimen. When the tensile strength determined by the test is 63,000 lb. or greater the minimum elongation shall be 22 per cent for plates 3/4 in. and under in thickness and 20 per cent for plates over 3/4 in. in thickness. The quench-bend specimen shall bend through 180 deg. around a curve the radius of which is one and one-half times the thickness of the specimen.

Edward La Bas & Co., London, England, have opened an office at 82 Beaver Street, New York City, in charge of F. W. Hall, to export iron, steel and metals.

OBITUARY

Capt. GABRIEL C. McDONALD, president St. Louis Steam Forge & Iron Works, St. Louis, Mo., died June 16, aged 82 years. He was a pioneer foundryman of St. Louis and a veteran of the Civil War, in which he acquired his title and rank. He personally forged the guns constituting the famous Totten battery of the Civil War, and among other achievements was the heavy forging, for those days, done by him or under his direction. One of his successful feats was the covering of the full length and the end of one of the heaviest battering rams used by Northern gunboats with a steel forging 2 in. thick, a remarkable achievement for that day. He also personally supervised the arming of the Eads flotilla. Of late years he had not been particularly active in his business, though still keeping watch over it to a greater degree than usual with a man of his years. He leaves one son and two daughters.

JOHN D. HUGHES, superintendent of the Putnam Machine Company, Fitchburg, Mass., and Inar G. Lindstrom, production manager, were killed in an automobile accident at Ashby, Mass., June 15. Mr. Hughes was born in Bridgeport in 1874 and learned the machinist and tool-making trade with the Eaton, Cole & Burnham Company. Later he entered the designing and engineering department, where he remained until 1900. The following three years he was connected with a concern in Berlin, Germany, and returned to take a position in the engineering department of the Kennedy Valve Company, Coxsackie, N. Y. In 1906 he joined the engineering department of the Bullard Machine Tool Company, Bridgeport, Conn., and was advanced to superintendent of production. A little over a year ago he took the position that he held at the time of his death.

Use of Slags for Fertilizing

Utilization of iron and steel works slags was discussed by E. C. Brown, chief civil engineer, Carnegie Steel Company, Pittsburgh, in a paper read before the Engineers' Society of Western Pennsylvania and printed in the January issue of the Proceedings of the Society. Little commercial or industrial use, he said, has been made of either open-hearth or converter slags, as compared with blast-furnace slag. When slag is high in lime, it may be returned to the blast furnace as a flux. Open-hearth slag has been ground and used in agriculture as a soil corrective, giving higher and quicker results than lime applied in the usual form. At Birmingham, Ala., slags from high phosphorus local ores are being built up by recharging until they contain as high as from 12 to 18 per cent of phosphorus, thereby being about in the same class of fertilizer as imported "Thomas meal" or phosphate slag.

A dry granulation process, he mentioned also, has been developed in Germany for preparing slag for cement. The essential feature of the process is a rotating cylinder into which the slag stream is directed with a blast of air and a small amount of high pressure steam. The product is dense and contains but little moisture.

Officials of the Lake Superior Corporation state that there is no truth, so far as that corporation is concerned, in the newspaper report concerning a proposed amalgamation of the Steel Company of Canada, Dominion Steel Corporation, Lake Superior Corporation and the Nova Scotia Steel Company. It is pointed out that the Canadian criminal code contains a very drastic section against the forming of a combination to control such a staple as steel or iron.

Rogers, Brown & Co. have sent out from their Cincinnati office a card 8 1/2 x 11 in. which is marked by striking colors and text. One of its statements is that in 1915 Rogers, Brown & Co. sold 22.14 per cent of the merchant pig iron produced in the United States. The firm's total sales of pig iron, coke, fluorspar, etc., in the year were 3,281,523 tons.

IMPURITIES IN SPELTER

Their Effect on Its Properties—Cadmium in Zinc or Brass

The effect of impurities on zinc and especially the effect of cadmium on brass was discussed by W. A. Cook, of the Matthiessen & Hegeler Zinc Company, La Salle, Ill., at the meeting of the metal branch of the National Hardware Association at Pittsburgh, June 2. What was said on these two points is as follows:

Spelter with few exceptions contains lead and iron, these being the chief impurities. Cadmium is frequently present in small amounts. In still smaller quantities, usually little more than traces, arsenic, antimony, sulphur and copper are also found. Tin may also occur in remelted spelter. In some special brands of high grade American spelter the lead does not exceed 0.02 per cent and iron 0.01 to 0.02 per cent. In good ordinary brands from 0.4 to 1.0 per cent of lead and 0.03 to 0.05 per cent of iron are usually found.

EFFECT OF IMPURITIES ON SPELTER

The effects of impurities on the metal are as follows:

Lead.—In spelter intended for rolling a small percentage of lead is desirable, and up to 1 per cent it has no injurious effects on the malleability or ductility of the metal. When the spelter has to be used for making brass which has to undergo severe mechanical treatment, as, for example, the manufacture of cartridge cases, it should contain as little as possible, not exceeding 0.1 per cent.

Iron.—The effects of iron are to increase the hardness and brittleness of zinc and reduce its malleability, but when the refining by liquation has been properly conducted there is insufficient present to affect these properties. When iron is present in excessive amounts the bright cleavage planes of the fresh fracture of a cake will show grey specks scattered over them. For spelter intended for the manufacture of brass, 0.05 per cent of iron is often specified as the limit, but it is best lower for brass of high ductility and malleability. Zinc may be completely freed from iron by redistillation, the use of iron tools and appliances being avoided.

Cadmium.—Cadmium is a material closely allied to zinc with the ores of which it frequently occurs. It is tin white in color, malleable and ductile and brilliant in luster when fresh, but becomes dull on exposure to the air. Its malleability and ductility are such that it can be beaten out into thin foil and drawn into wire.

Cadmium is rarely present in zinc in injurious proportions. It is especially liable to occur, however, as Professor Ingalls claims, in redistilled zinc. In two plates of a sample half ton of so-called pure redistilled spelter 5.08 per cent of cadmium was found, but this is very exceptional. Muntz metal made with this spelter broke with a crystalline fracture closely resembling that produced by antimony. However, no sensible effect on the properties of zinc is produced, even when 1 per cent is present, and nearly always the percentage does not reach that amount. It is said to discolor "zinc white" made from zinciferous materials containing it.

Tin.—Tin tends to make zinc very hard and brittle in rolling, and although it is not of common occurrence, except in remelted spelter, as Professor Ingalls states, yet it should always be looked for.

Arsenic, Antimony, Copper, Sulphur and Carbon.—These elements are scarcely ever present in sufficient quantities in spelter to affect its properties either for rolling or the manufacture of alloys. Arsenic, however, should be absent in zinc intended for the precipitation of gold in the cyanide process.

EFFECT OF CADMIUM IN ZINC OR BRASS

I would like to call your attention to a paper that was prepared and handed to me by one of the best known metallurgists in the United States, in connection with the question of cadmium in brass mixtures. He has made extensive tests on this subject and it is fair to assume that his conclusions are right.

While this question has not been made the subject of very exhaustive researches by manufacturers of copper alloys and very little appears in scientific publica-

tions relating to it, at the same time it has been the cause of considerable discussion among metal users. The results of what might, at the present time, be called incomplete investigations, indicate that cadmium when present in spelter in amounts as high as 1 per cent and over would be detrimental to the manufacture of high-class brasses such as are used for cartridge metal or deep drawn stock.

In quantities less than one-half of 1 per cent, however, personal experience has proved that cadmium need not be considered as having injurious effects on brass mixtures. As a matter of fact the difference in volatilization points of cadmium and zinc plays a most important part in the reaction which takes place when the metals are heated. Zinc melts at 415 deg. C. and boils at 940 deg. C., so its volatilization point may be taken at somewhere near its boiling point. Cadmium melts at 320 deg. C. and boils at 778.6 deg. C. Therefore, it will be seen that there is sufficient difference between the two so-called volatilization points so as to enable a separation to be made of the two metals by heat and as a matter of fact this is what is done in the production of cadmium itself.

This difference also in temperature, of course, leads to the logical conclusion that cadmium will oxidize at a lower temperature than zinc and this is a fact. So it might be said, with entire accuracy that, in using a spelter containing an amount of cadmium up to one-half of 1 per cent, the cadmium will act as a deoxidizer on the copper and form CdO or cadmium oxide and come to the top of the pot of metal before the zinc performs the same office, and it is the writer's personal experience, upon the analysis of such metal made with zinc carrying cadmium, no cadmium was found in the brass so made.

Of course, cadmium that might remain in the brass and exist as a cadmium-copper alloy or cadmium-zinc-copper alloy would cause the resulting brass to be brittle and would not admit of the malleable properties that are required in commercial brass.

Now in the case of brass, we first melt copper at a temperature of approximately 1100 deg. C. and then into this we introduce the zinc which melts at 415 deg. C., and consequently there is every chance for the cadmium to volatilize and oxidize and therefore our cadmium, as said before, is removed in this way.

As a summary then of what is said above, it is the writer's experience that cadmium in zinc in amounts anywhere up to one-half of 1 per cent is not at all prejudicial for the use of such zinc in the manufacture of brass.

Cadmium is used in electroplating in connection with silver, properly proportioned, making a whiter, harder and more durable finish than pure silver.

To show its impervious nature two steel tubes were prepared, one nickel plated, and one cadmium plated, and they were exposed to conditions of rapid rusting. In a due time the samples were taken out and the steel nickel plated tubes were completely covered with rust and the tubes prepared and plated with cadmium were perfectly good and showed the impervious nature of the cadmium.

Cadmium with a small percentage of silver has been employed for a number of years in England for coating steel parts with success.

Cerium-Iron Alloys

Alloys of cerium with iron, containing 55 to 85 per cent cerium, are pyrophoric, which property is increased by quenching. A writer in the *Zeitschrift für Metallgraphie* states that a microscopical examination of cerium-copper alloys shows that the two metals in the molten state are completely soluble in each other, but that in the solid state there is no solid solution, the four intermetallic compounds being Cu_3Ce , Cu_2Ce , Cu_2Ce and $CuCe$. Three typical eutectics, with 17, 44 and 45 per cent of cerium, respectively, occur. Above 5 per cent cerium, the hardness of the alloys increases, the greatest hardness being in the compounds Cu_3Ce and Cu_2Ce , though the hardness of the eutectics is low.

Metallic cerium is now being made electrolytically in the United States and is held at \$8 to \$9 per pound.

Central Station Power for Steel Mills

In discussing the possibility of operating steel mills by means of electric current purchased from the commercial central station, K. A. Pauley in the *General Electric Review* opposes the disposition manifest in the steel industry to regard 60-cycle current as unsuited to steel mill operation. The foundation for this feeling probably lies in the fact that all large steel works have adopted 25-cycles as the frequency of their power systems. As a matter of fact many of the constant-speed auxiliaries in steel mills are driven by induction motors and with 60-cycle current more speeds are available than with 25 cycles. Further, most of the equipment such as motors, generators, transformers, etc., is cheaper when built for 60-cycles and is equally efficient and reliable. Twenty-five-cycle current, however, has some advantage over 60-cycle current when applied to slow-speed direct-connected main roll motors. The power factors of such motors is usually higher for some very light capacities and costs much less.

The difficulty of operating gas-engine-driven generators at 60 cycles has also influenced the adoption of 25-cycle current in the steel mill. Many mills are of such type and size that they are driven either through gearing or rope transmission. This promotes the use of motors of moderate speeds for which 60 cycles is at least as satisfactory if not slightly preferable. It may be said in general that 25-cycle current possesses little, if any, advantage over the 60-cycle as the steel mill frequency for those plants which will consider purchasing outside power.

The writer draws the following general conclusions: 1. If for reasons other than question of frequency, power for the steel plant is to be developed locally, 25 cycles should be designated as the operating frequency except possibly in cases of small plants referred to below. 2. For plants in the second group, if reliable power can be purchased at a reasonable rate, the mill frequency should be that of the available source of supply and the necessary power purchased. It is conceivable that it might be to the interest of the steel company to operate its own plant, although from power considerations alone this would seem unwise, and even in such cases the adopted frequency should be the same as that of the local public service company so that current can be obtained from the latter in the event of a break-down.

Zinc Exports Still Large—Brass Exports Larger

Zinc exports—pig, bars, plates and sheets—from the United States for the first three months of 1916 continue at record-breaking rates, as the following table from Government data shows:

Period	Gross Tons	
	Gross Tons	Per Month
1915	111,788	9,315
1914	57,899	4,825
1913	6,957	579
January, 1916	12,512	
February, 1916	11,357	10,559
March, 1916	7,808	
August, 1914, to March, 1916, 20 war months	200,617	10,031

It will be seen from this that the average exports for the first quarter of this year of 10,559 tons per month were larger than the average for 1915 of 9315 tons per month. The contrast between the totals for 1913 and 1915, however, is striking evidence of the extent to which this country has displaced Germany in supplying the world's needs for zinc or spelter. The largest exports of any one month since the war started were 17,005 tons in September, 1914, with 16,354 tons in December, 1914, and 13,570 tons in January, 1915. Until October, 1915, the exports then fell below 9000 tons per month and then rose again into five figures.

A very large quantity of zinc has also been exported as brass in bars, plates and sheets. Official Government data give the following:

Period	Gross Tons	
	Gross Tons	Per Month
1915	29,585	2,465
1914	3,176	264
1913	2,728	227
January, 1916	5,332	
February, 1916	8,565	7,517
March, 1916	8,715	

The present brass export rate is therefore over

three times that of 1915, or 7537 tons per month, against 2465 tons per month in 1915, and only 264 tons per month in 1914.

The valuation of the 1915 spelter exports was \$31,332,395, or \$280 per ton, against \$955,667 for the 1913 exports, or \$137 per ton.

Heat Treating Steel Rails

The heat treatment of steel rails, using the usual methods of treating steel, has not been successful owing to the varying temperatures at which the rails leave the rolls, the great and varying speed at which they travel and the variation in weight and therefore mass to be cooled. This statement is made by Christer Peter Sandberg of London, England, in discussing the claims of his patent (U. S. 1,178,352—April 4, 1916) for a method of treating steel. The inventor has found that "if carbon steel, while at a temperature above the critical, is treated with an elastic fluid such as air or steam, or a very finely divided or atomized water or brine, or both elastic fluid and liquid together, delivered on the surface of the steel so as to cool it moderately rapidly, or quicker than it would take place normally, but not so swiftly as to produce a brittle or martensitic structure, the desired hard and tough sorbitic structure can be secured without double heating or reheating, or the formation of fine cracks."

Mr. Sandberg avails himself of the heat existing in the rail after the completion of the rolling operation. While the rail is still above the critical temperature, steam or air, or a mixture of air and steam, is caused to impinge on the head of the rail for a time varying with the weight and section and the temperature. The operation is so conducted that the rate and degree of cooling are such that when the cooled upper portion of the head is reheated by any heat retained in the upper part not yet cooled, or cooled more slowly, the hard and tough structure produced is retained and the upper part is of great hardness combined with toughness, the other portions of the section being practically unaffected. No reheating, before and after the rapid cooling, is claimed necessary in practising the invention.

The Vulcan Trading Corporation, 120 Broadway, New York, organized with \$100,000 capital stock, is a consolidation of the businesses of Archibald J. Wolfe, London & Lancashire Trading Company, and F. Veithardt, export merchants in iron and steel, machinery, chemicals, textiles, etc. The new company will particularly act as export agent for American manufacturers under one head for responsible foreign concerns. Mr. Wolfe, who was for a number of years connected with the United States Department of Commerce as commercial agent and later acted for several years as the Russian representative of the United States Steel Products Company, will have charge of the Russian department and also the machinery department. Mr. Veithardt, who was the principal director of the London & Lancashire Trading Company, the New York office of which is merged with the new enterprise, will, with several experienced assistants, handle the iron and steel trade. Competent managers are attending to the trade in chemicals and textiles.

To assist in a practical way those who are now exploring twenty townships in northern Wisconsin for iron ore, as the result of the examination last year by the Wisconsin Geological Survey, W. O. Hotchkiss, State Geologist, Madison, has prepared blueprints showing each of these townships, with magnetic lines, roads, streams, etc. So much activity in ore exploration has not been known in Wisconsin for many years. The W. D. Edison Company, Duluth, Minn., is one of the most active explorers and has leased considerable acreage on the royalty basis. Drilling will start July 1.

Tin exports from the Federated Malay States for May were 3722 tons against 3823 tons in May, 1915, and 4135 tons in May, 1914. The total exports for the first five months of 1916 were 18,224 tons, as compared with 19,270 tons and 20,599 tons to June 1, 1915, and 1914 respectively.

Pittsburgh and Nearby Districts

The Pressed Steel Car Company confirms the report that it has received an order from the British Government for 100,000 9.2-in. shells. It will make them at its works at McKees Rocks, Pittsburgh, and it has already covered on the 11,000 tons of steel rounds required. The report that the shells would cost \$25 each is wrong, as they will cost somewhat less. The building of 7000 cars for Russia was completed some weeks ago, and the company is now filling an order for 2000 cars for France. It reports very few orders for cars being placed by domestic railroads.

The Standard Tubing Catcher & Supply Company, Pittsburgh, with a capital of \$50,000, has been incorporated to manufacture appliances for catching and receiving tubing from oil and gas wells.

Steel companies are declaring their intention of allowing a certain number of employees at stated times a vacation of one month to take military training at the camp at Plattsburg, N. Y., with full pay while away from their work. The Youngstown Sheet & Tube Company, Brier Hill Steel Company and American Sheet & Tin Plate Company have recently taken this action.

The Pittsburgh By-Product Coke Company, incorporated under the laws of Delaware with a capital stock of \$10,000,000, will engage in owning and operating plants for the manufacture of coke and its by-products. It will own, among other securities, all the stock of the Seaboard By-Product Coke Company, now building a plant of 110 coke ovens at Jersey City, N. J., and the Minnesota By-Product Coke Company, building a plant of 55 coke ovens at St. Paul. H. B. Rust is president; W. F. Rust and C. J. Ramsburg, vice-presidents; S. T. Brown, treasurer. The directors are A. W. Mellon, R. B. Mellon, H. W. Croft, Hamilton Stewart, H. B. Rust, W. F. Rust and C. J. Ramsburg, all of Pittsburgh.

The movement of ore from Lake docks to the Pittsburgh district is the heaviest ever known. On Saturday, June 10, the Pittsburgh & Lake Erie Railroad, under the personal supervision of James Schoonmaker, vice-president, unloaded from vessels and loaded into cars for furnaces 1609 carloads of ore, besides putting 125 carloads on the docks. Of the 1609 carloads, 1385 were for blast furnaces in the Pittsburgh district. These cars were unloaded by noon Monday, June 12, and were returned empty that night for reloading at the harbor at Ashtabula, Ohio. On one day recently the Pittsburgh & Lake Erie moved a solid train of 99 cars, with a gross tonnage of 7586, of which about 4800 tons was ore, all consigned to the Aliquippa blast furnaces of the Jones & Laughlin Steel Company.

The Moltrup Steel Products Company, Beaver Falls, Pa., has started work on a three-story brick and concrete building in which equipment will be installed to manufacture cold drawn steel bars and milled and ground specialties. The company is also making other additions and improvements to its plant, and their total cost will be \$150,000. Its products now consist of cold drawn hexagon screw steel; squares, hexagons and special shapes; finished machine keys; machine racks, finished crankshafts and ground steel plates.

The new plant of the National Steel Casting Company at New Cumberland, W. Va., is nearly completed. The equipment includes a 20-ton open-hearth furnace, which will be started about July 1, and the entire plant, is expected to be in operation shortly after. F. H. Zimmers, Hartje Building, represents the company in Pittsburgh.

On Monday, Tuesday and Wednesday of this week a Safety First rally was held in Pittsburgh under the direction of the local branch of the National Safety Council. The Department of Labor and Industries of Pennsylvania, the Pittsburgh Chamber of Commerce, the University of Pittsburgh, the Carnegie Institute of Technology and many of the large manufacturing concerns in the Pittsburgh district took active part in the program. The opening session was held in Memorial Hall in that city. The celebration was arranged in a very short time, so that advantage could be taken of the arrival in Pittsburgh of the Safety First train of the United States Government. This train is composed

of 12 large steel coaches, fitted with safety exhibits and appliances, and is being sent to the principal cities of the country for exhibition purposes.

A meeting of stockholders of the Petroleum Iron Works Company will be held in Sharon, Pa., July 1, at which a proposition will be considered to increase the capital stock from \$1,000,000 to \$3,000,000. On July 15 a meeting of stockholders of the Pennsylvania Tank Car Company, an identified interest of the Petroleum Iron Works Company, will be held in Sharon to consider an increase in the capital stock from \$500,000 to \$1,000,000. The purpose of these increases is to provide more working capital and also to supply funds for material enlargements to be made to both plants. If the propositions are approved, both concerns will at once start work on additions.

The American Bridge Company, Pittsburgh, has received a contract from the Carnegie Steel Company for 70 steel barges to be used by the latter company in transporting coal from its mines on the Monongahela River to its Koppers by-product coke ovens now being built at Clairton, Pa. Each barge will be 175 ft. long and will carry 900 tons of coal on an 8-ft. draft of water. The barges are built largely from plates $\frac{3}{8}$ and $\frac{5}{16}$ in. in thickness.

The report that the Westinghouse Electric & Mfg. Company, East Pittsburgh, had received an order from the New York, New Haven & Hartford Railroad for 100 electric locomotives is officially denied.

Boys, Porter & Co., Connellsville, Pa., with a capital stock of \$150,000, has been incorporated by C. M. R. Boys, James M. Reid, J. Donald Reid and James C. Munson, all of Connellsville, Pa.; Elizabeth M. DuShane, Mill Run, Pa.; S. H. DuShane, Indianapolis, Ind., and Alexander J. Johnston, Butte, Mont., to manufacture steam and electric pumps and other supplies for mines and coke plants.

The Hammermill Paper Company, Erie, Pa., will build and equip a three-story power house, 50x100 ft., steel frame and brick, at its plant on East Lake Road, at an estimated cost of \$150,000.

The American Sintering Company, a Chicago corporation, operating a plant for some years at the Andrews & Hitchcock furnaces, is planning to erect a plant on Poland Avenue, Youngstown, Ohio, to cost \$100,000, to take care of the flue dust at the furnaces of the Youngstown Sheet & Tube Company at East Youngstown and those of the Republic Iron & Steel Company at Hasletton.

The Bessemer Brick Company, Monongahela City, Pa., with a capital stock of \$10,000, has been incorporated by J. A. Spencer, F. R. Colvin and Louis Raynal, to manufacture firebrick.

Labor Notes

Coal miners employed by the Vesta Coal Company in the Pittsburgh district, who have been on a strike, resumed work last week at an advance of about 5 per cent.

The American Iron & Steel Mfg. Company, Lebanon, Pa., has announced an advance of \$1 in puddlers' wages to \$6 per ton, effective July 1.

The molders at the foundry of Pardee Bros. & Co., at Lattimer, Pa., have been notified of a voluntary wage increase of 10 per cent.

The strike of the machinists, toolmakers and helpers was called in Newark, N. J., Thursday, June 15, according to schedule. More than 9000 workmen had joined the ranks of the strikers before the close of the day. The strike is for an 8-hr. day, time and a half for overtime up to 4 hr., and double after that. On Saturday, June 17, union leaders said that of the 54 plants thus far affected 18 have granted the demands of the workers. The threat is made that unless the other plants give in there will be a general strike affecting 310 plants, employing 30,000 workers. The strike is in charge of the International Association of Machinists. Members of the Brotherhood of Metal Workers and the Amalgamated

Society of Engineers in the plants affected are striking in sympathy.

Advices from Milwaukee, Wis., state that a crisis is developing in the labor situation and that the long-expected demand of the organized machinists for an 8-hr. day without reduction of the present wage for 10 hr. will be laid before the employers shortly after July 1. The machinists are dissatisfied over the delay in action on the hours-of-work proposition caused by the investigation by the Industrial Commission of Wisconsin into the situation in competitive industries in other centers which is being carried on at the request of Milwaukee employers. Labor leaders assert that if a strike is declared it will be the greatest in the history of Wisconsin, because 10,000 machinists, molders and patternmakers would walk out, and at least 40,000 people would be directly affected.

A Pittsburgh court, on Saturday, June 17, issued an injunction against individual members and officers of the Iron Molders' Union, restraining them from interfering with molders in foundries in the Pittsburgh district who desire to remain at work. A strike of the molders in the foundries at Pittsburgh has been on since last December. The men demand an 8-hr. day with 9-hr. pay, which the foundry operators have refused to grant.

Merger of New York and Puget Sound Ship Repair Plants

The Todd Shipyards Corporation has been incorporated under the laws of New York to combine the properties and business of the Robins Dry Dock & Repair Company, Brooklyn, N. Y., the Seattle Construction & Dry Dock Company, Seattle, Wash., and the Tietjen & Lang Dry Dock Company, Hoboken, N. J. The joining of these three companies under the management of the Todd Shipyards Corporation will give it what is considered to be one of the largest ship repair businesses in the world.

The Robins Dry Dock & Repair Company has a yard in the Erie Basin, South Brooklyn, N. Y., which is the largest ship repair yard on New York harbor. It is designed for the repairing of ocean-going vessels, and its drydocks can accommodate ships of large size. The Tietjen & Lang Dry Dock Company has at Hoboken, N. J., the second largest ship repair yard on New York harbor. The Seattle Construction & Dry Dock Company owns an extensive shipbuilding and repair yard at Seattle, Wash., which is one of the largest yards on the Pacific coast, and the largest north of San Francisco. This yard is equipped to build large ships of either steel or wood.

The corporation will start business with 116,000 shares of no par value and an authorized indebtedness of \$6,750,000 and \$3,000,000 five-year convertible notes. The present management of the Robins Company, of which William H. Todd is president, will be in charge of the new organization.

Correction.—In THE IRON AGE of June 8, on page 1426, the statement was made that the Laursen Automatic Pump Company had bought the "defunct" Hess Iron Works plant. We are advised that the Hess Iron Works is not, nor has at any time been, in the bankruptcy court, and C. A. Straubel, as incorrectly stated, is not a trustee of the Hess Iron Works. He is acting as trustee for a number of stockholders of the company that purchased real estate formerly owned by the Hess Iron Works. The Hess Iron Works is still in business and at the same location, with the exception of the machine shop building that was purchased by the Laursen Automatic Pump Company.

Chromic iron ore valued at \$36,744 was mined in the United States in 1915, an increase of \$28,029 over the value of the 1914 product, according to the annual statement of the U. S. Geological Survey just issued. The production was augmented largely by increased efforts in California.

Program of Testing Materials Meeting

The revised program of the annual meeting of the American Society for Testing Materials, to be held at the Hotel Traymore, Atlantic City, N. J., June 27 to 30 inclusive, contains the following papers of interest to readers of THE IRON AGE:

Tuesday, June 27, 8 p. m.—"Tests on the Hardening and Tempering of Eutectoid Carbon Steel and on the Shore Test," by Dr. Henry M. Howe and Arthur G. Levy. "Some Experiments on the Plastic Elongation of Wire," by A. V. de Forest. "The Acceptability of Linseed Oil," by C. D. Holley.

Wednesday, June 28, 10 a. m.—"National Standard Specifications and Their Relation to Export Trade," by William R. Webster. "Heat Treatment of Carbon-Steel Locomotive Axles: Water vs. Oil Quenching," by C. D. Young. "Recrystallization as a Factor in the Failure of Boiler Tubes," by A. E. White and H. F. Wood.

Wednesday, June 28, 8 p. m.—"Topical Discussion on the Relation Between Yield Point and Proportional Limit in Various Grades of Steel," by J. E. Howard, T. D. Lynch and H. F. Moore and F. B. Seely. "Endurance and Impact Tests of Metals," by D. J. McAdams, Jr. "Constants and Diagrams for Repeated Stress Calculations," by H. F. Moore and F. B. Seely. "Method for Testing the Durability of Pipe Under Corrosion," by F. N. Speller.

Thursday, June 29, 3 p. m.—"Practical Methods for Testing Refractory Fire Brick," by C. E. Nesbitt and M. E. Bell.

The evening of Thursday, June 29, will be reserved for a smoker.

Friday, June 30, 10 a. m.—"Aluminum Bronze—Some Recent Tests and Their Significance," by W. M. Corse and G. F. Comstock. "An Investigation Leading to Specifications for Brass Condenser Tubes," by A. E. White.

Friday, June 30, 3 p. m.—"An Apparatus for Testing the Standard Cast-Iron Arbitration Bar," H. L. Morse.

Committee reports will be presented as follows: Wrought iron, Tuesday morning. Coal; methods of sampling and analysis of coal; shipping containers, Tuesday afternoon. Preservative coatings, Tuesday evening. Steel; heat treatment of iron and steel; corrosion of iron and steel; magnetic properties of iron and steel, Wednesday morning. Methods of testing, Wednesday evening. Non-ferrous metals and alloys, Friday morning. Cast iron and finished castings; coke, Friday afternoon.

Kansas City Bolt Company Changes Hands

The Kansas City Bolt & Nut Company, Kansas City, Mo., which was organized by the late J. H. Sternbergh of Reading, Pa., in 1888, and has ever since been controlled and owned by the Sternbergh family, was, on June 15, taken over by a group of Kansas City and St. Louis men, they having purchased the entire stock of the company from the Sternbergh estate.

George T. Cook, who was long connected with the company as general sales manager, but recently independently in the iron and steel business at Kansas City, becomes the new president. Solomon Stoddard, identified for years with the management, will continue in active charge as vice-president and general manager. H. R. Warren will continue as secretary and treasurer. The directors are George T. Cook, A. L. Gustin, Solomon Stoddard and H. R. Warren, all of Kansas City, and E. A. Nixon, St. Louis, prominent in the tie and timber trade. A number of the employees, in addition to the above, have become stockholders under the new regime.

The company, which manufactures merchant bar iron, track bolts, nuts, rivets, machine bolts, forgings, etc., will continue operation without interruption. The reorganization has largely increased its finances and important improvements and extensions are contemplated.

Sheet and Tin-Plate Wage Settlement

Unofficial advices are that at the conference in session at Atlantic City, N. J., for about a week, between scale committees of the Amalgamated Association and officials of sheet and tin-plate mills that sign the Amalgamated scale, a settlement of the scale for sheet and tin-plate mills for the year starting July 1 has been arranged. Wages of tin-plate mill hands will be advanced 4 per cent and sheet-mill workers 3 per cent on the same sliding scale basis as that now in effect.

Machinery Markets and News of the Works

RUSSIANS ARE BUYING

Steady Domestic Call for Single Tools

New Rumors of Consolidations of Machinery Makers Are Current, but They Lack Confirmation

In all the markets there is a steady influx of orders for one or a few machines of the standard types and makes, with toolroom equipment continuing in extra good request, but the domestic demand is light as compared with what it was a few months ago. The export business continues to be largely confined to Russian requirements, although the trade in Cincinnati is closely watching the Canadian market.

Several Russians, who make their headquarters in New York, but who visit the producing centers more or less frequently have done some heavy buying. Some are mentioned in the New York market. The trade also has before it an elaborate list of locomotive and boiler shop equipment issued by the Steel Company of America, 100 Broadway, but the representatives of this company do not state to which country they intend to export or give much detailed information.

Several tool builders in Cleveland have so increased their production that they have practically caught up on deliveries. One recent order placed in that city called for 25 automatic screw machines for export to Russia.

The Crane Company, Chicago, has taken out building permits for additions to its Corwith works, the cost of which is estimated at \$1,050,000.

Makers of machinists' small tools and instruments are far behind in deliveries in the Milwaukee territory.

Fresh rumors of consolidations in the machinery field are heard, one of the latest being to the effect that at least three manufacturers of bolt, nut and forging machines were to be brought together, but verification is lacking. It is known, however, that certain financial interests have been measuring the situation.

The waterfront strikes which lately tied up shipping in the Pacific Northwest have been settled.

New York

NEW YORK, June 20, 1916.

The domestic demand continues to be mostly for the smaller types of tools, especially tool-room equipment. There is a large amount of foreign inquiry in the market, and exporters still complain that deliveries are slow on standard machines which are wanted abroad.

Some extensive buying is being done by the Russo-Baltic Car Works Company, 1 Madison Avenue, room 242. The company has sent requests for catalogues and information to a great many manufacturers. A. M. Peskine of Iznoeskoff-Suckau & Co., Petrograd and Moscow, Russia, has been active as a buyer for the car works, and other companies.

John Karmazin, 680 Madison Avenue, New York, with whom is associated Gustav Klaas, has been purchasing for the Moscow Automobile Works, Moscow.

Many of the trade dealing in railroad equipment have received an inquiry for a large number of railroad shop tools

from the Steel Company of America, 100 Broadway, New York, whose representatives say the machines are wanted for the establishment of a plant abroad. The inquiry was issued in printed form, and the tools are wanted for the following production: 100 locomotives within 12 months; 100 boilers within 12 months, and 500 "general repairs." The list given specifies four of practically every kind of machine used in locomotive and boiler shops, and in some cases from 8 to 16 tools of one kind and size.

The communication states that complete catalogs are not desired; only such portions of them as deal with the tools under inquiry, accompanied by photographs or half-tone illustrations. The locomotives it is intended to build are not to exceed 225,000 lb. in weight. The tools are to be delivered within 6 months. The data requested is to be sent to the "Steel Company of America, J. S. P." (J. S. Popper). It is stated by a representative of the company that it has forwarded large quantities of miscellaneous machinery to Europe, but the names of the countries to which shipment was made are withheld.

Domestic railroads are buying freely of shop tools, other than machine tools.

The strike of machinists threatened for some weeks in Newark, N. J., was declared last week, and several hundred went out in 54 shops. According to union officials the number involved 7000 men, but the actual number is believed to have been nearer 1200. Many employees who had no grievances were forced to suspend work because of the shutting down of some of the affected plants. The machinists are demanding an 8-hr. day, time and a half for overtime up to 4 hr., and double time after that. Among the plants affected were those of the Otis Elevator Company, Harrison, and the Weston Electrical Instrument Company, Newark. Only a few men are out in Elizabeth. A few shops have granted the demand of the men.

It has been widely reported in the past few days that there was impending a consolidation of at least three makers of bolt, nut and forging machines, but confirmation is unobtainable. On the contrary, some of those declared to be interested say there is no foundation for the rumors. A Wall Street banking house is reported to have given some attention to such a consolidation of interests, but will make no admissions.

Leonid Smugge, representative of the Michelson Works, Petrograd, reported a week ago as interested in a large number of hand screw machines, is staying at the Hotel McAlpin, New York.

The Mohawk Valley Pipe & Foundry Company, Utica, N. Y., capitalized at \$300,000, has been incorporated by A. B. Maynard, J. Rothstein and J. A. Gunn.

The Pierce-Arrow Motor Car Company, Buffalo, has let contracts for an additional factory building, 60 x 400 ft., four stories, at its plant on Elmwood Avenue and the New York Central Belt Line, to cost \$100,000.

S. Cheney & Son, gray-iron founders and manufacturers of hardware specialties, Manlius, N. Y., have completed negotiations with the chamber of commerce, Oneida, N. Y., to lease for five years the three buildings and seven-acre site formerly occupied by the Oneida Foundry Company.

The Aluminum Company of America, Niagara Falls, N. Y., has awarded contract to the Turner Construction Company, 11 Broadway, New York, for the erection of a six-story reinforced concrete addition, 67 x 93 ft., to its plant at Buffalo Avenue and Nineteenth Street, to cost \$100,000.

The Merrimac Metal Products Company, Jamestown, N. Y., has been incorporated with a capital stock of \$60,000 to manufacture engines and special products. F. R. Andrews, W. C. Serfel and C. F. Fauch, Jamestown, are the incorporators.

The Sahlen Pack Company, Howard and Detroit streets, Buffalo, N. Y., is about to let contract for the erection of a one-story boiler house addition, 33 x 68 ft., to cost about \$4,000. Plans are being prepared for a six-story garage, 100 ft. square, to be erected on Fifty-fifth Street, west of Ninth Avenue, on a site recently purchased by Daniel Meeman, at a cost estimated at \$130,000. J. P. Crocker, 2017 Fifth Avenue, is the architect.

The Turner Construction Company, 11 Broadway, New York, has been awarded the general contract for the erection of a four-story reinforced concrete building for the Doehler Die-Casting Company, Court and Ninth streets, Brooklyn, approximately 50 x 125 ft., with an ell 25 x 54 ft., at Court and Huntington streets.

The Bossert Company, Utica, N. Y., has let contracts for erection of a factory, 61 x 105 ft., two stories, of reinforced concrete, at West Avenue and Hickory Street to cost \$20,000.

North Tonawanda, N. Y., will make improvements in its water pumping station on Little Island, to cost \$40,000. Martin Miller is clerk of the water board.

The Kerr Turbine Company, Wellsville, N. Y., has let contracts for a blacksmith shop 30 x 60 ft., one story, and for a pattern shop.

The Niagara Electric Chemical Company, Niagara Falls, N. Y., will build a four-story and basement factory, 50 x 176 ft., at Buffalo Avenue and Adams Street, of brick and steel. The contract for steel work has been let to the Buffalo Structural Steel Company, Buffalo.

The Groton Bridge Company, Groton, N. Y., has received general contract for the erection of the foundry and machine shop for the Cortland Forging & Machine Works, Cortland, N. Y., to cost \$35,000.

The Danahy Packing Company, Buffalo, has let contract for an addition to its plant at Clinton and Metcalfe streets and the New York Central Railroad, 32 x 120 ft., two stories.

The Myrick Machine Company, Olean, N. Y., will build a machine and power building, 35 x 84 ft., two stories, of brick and steel. The structural steel has been let to the Buffalo Structural Steel Company, Buffalo.

The International Agricultural Corporation, 61 Broadway, New York, has let general contract for building a fertilizer reduction plant at East Buffalo, N. Y., to replace buildings recently destroyed by fire.

The Buffalo Potteries, 663 Seneca Street, Buffalo, will build a two and three-story addition to its plant at Hayes Place and the Pennsylvania Railroad, Buffalo. Bids are being taken. D. D. Martin is secretary.

The Kittinger Furniture Company, Front Avenue and Wilkeson Street, Buffalo, has purchased a four-acre site on the Erie Railroad and is having plans prepared for a reinforced concrete factory.

The new brick factory and machine shop of the Acme Pattern & Machine Company, Buffalo, to be erected at Niagara Street and Forest Avenue, will be 60 x 160 ft., 2 stories and basement, with wing 40 x 60 ft.

The Corona Typewriter Company, 141 West Forty-second Street, New York, will build a four-story and basement reinforced concrete and steel factory, 50 x 162 ft., at Groton, N. Y. Bids are being taken.

The Habirshaw Electric Cable Company, 10 East Forty-third Street, New York, is having bids taken for an addition, 200 x 300 ft., two and three stories, to its plant at Yonkers, N. Y. The estimated cost is \$100,000.

A. B. Schultz, manufacturer of automobile and marine engines, Buffalo, will build a factory, 60 x 100 ft., of concrete block construction at West and Forest avenues.

The Hydrol Company, 125 Front Street, New York, will build an oil plant at Union, Stand and Iroquois streets, Niagara Falls, N. Y. The first building will be 50 x 100 ft., two stories and basement, and will cost \$30,000.

Baltimore

BALTIMORE, MD., June 19, 1916.

The Consolidated Ferry Company, foot of Chester Street, Baltimore, has amended its charter to include the building and repairing of boats, motors, engines, etc. The offices will be removed to 2039 Aliceanna Street. Paul J. Johnson is president.

A garage, 45 x 250 ft., is planned by the Cityco Realty Company, 2 East Lexington Street, Baltimore.

A permit has been granted for the construction of an addition to the plant of the Speakman Pipe & Supply Company, Thirteenth and Spruce Streets, Wilmington, Del., to cost \$2,000.

The Richmond Strip & Screen Company, Richmond, Va., has been incorporated with \$15,000 capital stock. A. R. Hagner, Jr., is president.

Plans to erect a one-story factory are being made by the Portsmouth Barrel Company, Portsmouth, Va.

The Caroline Foundry Company, 723 South Caroline Street, Baltimore, iron and brass founder, will build a one-story brick addition, 22 x 31 ft.

Philadelphia

PHILADELPHIA, PA., June 19, 1916.

Probabilities are that the anthracite mines face a busier summer than usual. It is apparent that the companies in the Lehigh field have settled on a policy of active work through the hot season, because it is cheaper to operate the collieries then than during the winter. Surplus fuel mined will be stored for shipment to market in the fall, when the prices go up under the new schedule.

The coming of the S-S-E Motor Company's plant marks a stage in the development of Philadelphia's automobile industry. While it is true that the actual assembling of automobiles is done for the most part in and around Detroit, the Quaker City is now one of the important centers of automobile manufacture. To a large extent, automobiles have been made in this city and shipped to Detroit for assembling. The Hale & Kilburn Company makes metal and combination bodies for a number of well-known makes of cars at the rate of 1000 a day. The Edward G. Budd Company is making 350 all-metal bodies daily for one Detroit manufacturer. The J. G. Brill Company and the Charles S. Caffrey Company are other Philadelphia firms turning out auto bodies, and all these companies make other parts as well.

About 100 men are now employed in the construction of the new plant of the Sun Shipbuilding Company at Chester, Pa. About \$500,000 will be spent. The work was started June 5.

It is stated that the work of enlarging the plant of the Benzol Products Company at Marcus Hook, Pa., which will probably amount to over 30 per cent of its present capacity, has been started.

The Acme Wagon Company, manufacturer of farm wagons, Emigsville, Pa., lost three manufacturing buildings by fire May 20, including blacksmith and machine shop, 80 x 300 ft., paint shop, 70 x 75 ft. and 45 x 60 ft., and oil storage house, 25 ft. square, with damage estimated at over \$100,000. The storage house and wood-working department were saved. The damage to the machinery cannot be stated until salvage is further progressed. The force of about 125 employees saved nearly all their small tools. The company is now operating in temporary quarters and is commencing to rebuild. The manufacture of auto trucks had been recently added to the company's line. E. K. Emig is president and treasurer.

The Bond Foundry & Machine Company, Manheim, Pa., manufacturer of power transmission specialties, will erect an addition to its plant, 95 x 100 ft., to take care of its increasing business. M. T. Williams is manager.

The Hershey Machine & Foundry Company, Manheim, Pa., has nearly completed the erection of a new machine shop, which will considerably increase its manufacturing facilities.

The Weimer Chain & Iron Company, Lebanon, Pa., has decided to rebuild the testing house at its Avon plant, which was recently destroyed by storm. The new building will be larger and will contain the latest appliances.

The General Electric Company, Philadelphia, has purchased the former site of a plant acquired by the National Tube Company, Chester, Pa., and probably will erect an electric power plant. The site comprises 22 acres.

The installation of machinery in the third new building of the Baldwin Locomotive Works, Eddystone, Pa., will begin in the near future as the building is nearing completion. About 400 men will be added to the payroll when the plant begins operations.

A heating plant, 50 x 175 ft., is being constructed for the Eddystone Munitions Corporation, Eddystone, Pa. It is said five furnaces for heat-treating shells will be installed.

The Harrisburg Chemical Company, Harrisburg, Pa., has been incorporated with a capital stock of \$15,000 by William R. Reinich, 605 North Second Street; William R. McCord and Charles C. Stroh to manufacture rust removing compounds.

C. Walker Jones, Inc., Philadelphia, has been incorporated with a capital stock of \$250,000 by C. Walker Jones, 1629 Greene Street, Philadelphia; Albert M. Bertram, Swarthmore, Pa., and J. E. M. Keller, 1819 North Van Pelt Street, Philadelphia, to manufacture needles and mill supplies.

The Delaware Tile Company, Garrettford, Pa., has been incorporated with a capital stock of \$10,000 by W. N. Blackburn and others to manufacture tile.

The Dynamic Balancing Machine Company, Philadelphia, has been incorporated with a capital stock of \$5,000 by W. H. Greene, 2130 Spruce Street; Frank P. O'Donnell, 1916 Rittenhouse Street, and Frank Willis, 4036 Baring Street, Philadelphia, to manufacture dynamic balancing machines and other machines.

The National Umbrella Frame Company, Twentieth and

Thompson streets, Philadelphia, has awarded contract to William Steele & Sons Company, 1600 Arch Street, Philadelphia, for the erection of an addition to cost about \$3,000.

New England

BOSTON, MASS., June 19, 1916.

A statement made by Joseph W. Powell, president of the Fore River Shipbuilding Corporation, Quincy, Mass., at a luncheon of naval architects held in connection with the dedication celebration of the Massachusetts Institute of Technology, shows the trend of thought of many manufacturers in New England at this time. Mr. Powell is quoted as saying: "The situation surrounding labor's wage demands is developing so fast that all the shipyards in the country soon will be forced to consider whether they should shut down rather than submit to impossible demands." He added that the Fore River Company had not accepted a new order in four months because of the possible necessity of such action. In many places, however, it is not the question of wages which is paramount to-day, but the question of housing such workmen as can be secured. An interesting instance of this situation is in Bristol, Conn., where the New Departure Mfg. Company has started the construction of 101 houses, 26 one-family and 75 two-family. The Bristol Brass Company has also just voted to build 35 one-family houses and a boarding house 320 ft. long. The boarding house will be a one-story structure and, when completed, will be a model of its kind. To list the manufacturing centers in New England where similar building operations are under way or in contemplation, would be to enumerate nearly every community well known in the metal-working world.

Plant expansion continues to be a feature of the industrial situation in Connecticut and to a much smaller degree in the other New England states. Outside of the metal-working field, new structures are springing up all through New England, especially textile plants.

One of the events of the week of world-wide interest was the removal of the Massachusetts Institute of Technology from its old quarters in Boston to its magnificent new buildings in Cambridge. The ceremonies attendant upon the dedication have found a place in the daily press all over the country because of the widespread interest in this institution. One mark of its influence is found in the fact that at the banquet which concluded the commencement exercises, gifts aggregating \$2,660,000 were announced.

For the first time in many months, there is a dearth of news of labor troubles in New England. Two or three minor disturbances occurred last week; but in every case a prompt settlement was effected by the granting of concessions of some kind. A few plants have strikes on at this time, but in most cases the working force has nearly reached normal and production has kept pace. The future is quite uncertain. Further outbreaks may take place at any time; but the real fever seems to have lessened greatly.

The Worcester Pressed Steel Company, Worcester, Mass., has received an order for 1,000,000 one-pounder cartridge cases, part of an order for seven million such cases to be made in this country for the Russian Government. The order calls for delivery in August.

The United States Cartridge Company, Lowell, Mass., has engaged 30,000 sq. ft. of space in the Bigelow, Hartford Carpet Mill Company building and will give employment to 1000 women, mostly as inspectors.

The National Fastener Company, Boston, Mass., has been incorporated with capital stock of \$25,000, by Sol D. Wenetsky, president; David Pearlstein, treasurer, and H. Bergson.

The Jernberg Metal Treating Company, Worcester, Mass., has been incorporated with capital stock of \$10,000, to do tempering, annealing and heat treating. Ralph V. Jernberg is president and treasurer. The other incorporators are L. E. Brightman and M. M. Isham.

The Clark Body Company, Amesbury, Mass., has been incorporated with a capital stock of \$25,000 to manufacture auto bodies. The directors are George E. Hodge, president; Thomas Clark, treasurer, and J. R. Graves.

The American Machine Gun Company, Boston, Mass., has been incorporated with capital stock of \$90,000. The directors are Edwin C. Fisher, president; Frank I. Jones, treasurer, and L. W. Lombard.

The new factory to be erected on Laurel Avenue, Torrington, Conn., by the Standard Company will be 54 x 309 ft., four stories. Bids are now being asked and the work will be started at once.

The Worcester Loom Works, Worcester, Mass., have been incorporated with capital stock of \$50,000 by Clinton Alvord, Charles A. Washburn and Edith L. Greenwood.

The King Safety Razor Company, Boston, Mass., has been incorporated with capital stock of \$50,000 by C. C. King, president; John A. Brennan, treasurer, and T. J. McGrath.

The New London Ship & Engine Company, Groton, Conn., has awarded a contract for an addition, 60 x 165 ft., two stories.

The Massachusetts Copper Castings Company, Boston, Mass., has been incorporated with capital stock of \$10,000. The directors are M. E. Thomas, president; M. B. Wilson, treasurer, and R. J. Holmes.

The Fafnir Bearing Company, New Britain, Conn., has increased its capital stock from \$225,000 to \$300,000.

The Simplex Time Recorder Company, Gardner, Mass., has bought the W. H. Bundy Time Recording Company of Syracuse, N. Y. The force of workmen employed by the Bundy Company, which was the pioneer manufacturer of the card system of time records, have been taken over by the Simplex Company and the entire business transferred to its factory.

The Noslip Pulley Plating Company, Boston, Mass., has been incorporated with capital stock of \$10,000. The directors are George W. Dow, president; Sylvester F. Whalen, 6 Beacon Street, treasurer, and K. W. Connor.

The Whitney Mfg. Company, Hartford, Conn., is to build a four-story addition, 58 x 112 ft. Bids are now being asked.

The General Machinery Company, Providence, R. I., has been incorporated with capital stock of \$3,000 by Eric L. Anderson, Harry M. Burt and Setrak S. Ovak.

The Scovill Mfg. Company, Waterbury, Conn., has awarded a contract for a new office building on Hamilton Avenue, 25 x 80 ft., two stories.

The American Graphophone Company, Bridgeport, Conn., has awarded a contract for \$60,000 worth of work which will consist of raising three of the present buildings one story, and the erection of a three-story addition, 25 x 400 ft.

The Bridgeport Steel Treating Company, Stratford, Conn., has been incorporated with capital stock of \$50,000. The incorporators are W. J. Bartley and F. R. Barrow of Bridgeport and Mathew Corbett and Mathew Corbett, Jr., of South Norwalk.

The Norton Company, Worcester, Mass., has awarded a contract for an addition, 116 x 134 ft., three stories, to its Gleason Avenue plant.

The United States Fastener Company, 95 Milk Street, Boston, Mass., has awarded a contract for the erection of a factory, 40 x 65 ft., three stories, at East Ninth Street and Columbia Road, South Boston.

The General Electric Company is to erect three manufacturing buildings at its plant in Lynn, Mass.

The Arrow Company, Springfield, Mass., has been incorporated with capital stock of \$25,000 to manufacture motors, etc., by I. H. Page, G. A. MacDonald and C. R. Culver.

The Atlas Machinery Company, Providence, R. I., has been incorporated with capital stock of \$30,000 by Volney P. Kinne and Charles A. Cunningham of Buffalo, N. Y., and E. W. White, Cranston, R. I.

The Howe Scale Company, Rutland, Vt., is having plans drawn for an addition.

The addition to be made to the plant of the American Emery Wheel Works, Waterman Street, Providence, R. I., will be 50 x 90 ft., three stories. The bids have been received, but the contract has not been awarded.

Chicago

CHICAGO, ILL., June 20, 1916.

The railroads have been slowly adding to their purchases, buying the tools on the various lists that have been issued a few at a time from other sources, particularly the general manufacturing trade. The business taken by local dealers is still very good, although the month of June will probably show somewhat smaller totals than did May, while the demand for second-hand machinery continues to run strongly. In the lines where deliveries of new tools are very protracted an increasing variety of new machinery is available and a larger buying results.

The Lyon Metallic Mfg. Company, Montgomery, Ill., has started work on an addition to its main factory building.

The Shanklin Mfg. Company, Springfield, Ill., manufacturer of brass novelties, will erect a factory, 50 x 180 ft., to cost \$10,000.

The Pfanziehl Company, Waukegan, Ill., has plans completed for the erection of a new shop.

The Illinois Specialty Mfg. Company, Bloomington, Ill., has been incorporated with a capital of \$75,000 by F. M. Frankeberger, A. L. Frankeberger and W. F. Kleinau. It

will manufacture a patent heater for ripening bananas, an invention of A. L. Frankeberger.

The American Carbon & Battery Company, East St. Louis, Ill., is having plans drawn for an additional building, to be used for a flashlight department.

The Lyon Metallic Mfg. Company, Montgomery, Ill., has increased its capital stock from \$100,000 to \$300,000.

The Dexter Company, maker of washing machines, Fairfield, Iowa, is building a three-story addition, of brick and steel construction, to its factory.

The Cummings Foundry Company, 1338 Cortland Street, Chicago, is preparing to erect a one-story brick and steel addition to its foundry, 75 x 100 ft., to cost about \$10,000.

The Crane Company, 836 South Michigan Avenue, Chicago, has taken out building permits covering the erection of additional buildings at its Corwith works, estimated to cost \$1,050,000.

The Western Crucible Steel Casting Company, Minneapolis, Minn., will spend \$50,000 on the enlargement of its plant. A. F. Reitzel is secretary-treasurer.

The Flour City Ornamental Iron Company, with a capital of \$500,000, has been organized to take over the business and plant of the Flour City Ornamental Iron Works, Minneapolis, Minn.

The Cooper Foundry Company, Atchison, Kan., has plans for a building, 48 x 60 ft., to be erected at once. This company has just been formed and is headed by Charles Cooper of St. Joseph, Mo.

Cincinnati

CINCINNATI, OHIO, June 19, 1916.

Machine-tool makers are watching the Canadian market very closely just now. A number of them have made trips to Canada lately, but, as far as can be ascertained, no additional large orders have been placed by buyers there. Russian orders for various kinds of machinery are reported by different firms, but purchases are not nearly so large as at this time last year. The domestic machine-tool business seems to be marking time, and orders are principally for single tools.

Electrical equipment is in better demand, although the improvement is not marked and is confined to the smaller generators and motors. Mill supply houses are still doing a good business, but state that manufacturers' orders are smaller than usual, indicating that they are only buying to fill immediate wants. The local labor situation continues to improve, and this is also the general report from other nearby manufacturing centers. The supply of common labor in some places exceeds the demand.

The Corcoran Mfg. Company, Cincinnati, recently incorporated, has leased a factory building at Winton Place, which will be fitted up for making automobile hoods, bodies, fenders and radiators. Considerable equipment will be required. John L. Corcoran is president.

The Sayers & Scoville Company, Cincinnati, carriage manufacturer, will build a factory on a site acquired on Bank Street. Its plant was recently destroyed by fire. The dimensions of the proposed building have not yet been given out.

The Ault & Wiborg Company, Cincinnati, has let contract for a reinforced concrete powerhouse, 50 x 89 ft., for its new plant in St. Bernard, a suburb.

The Triumph Mfg. Company, Cincinnati, maker of bakers' machinery, has increased its capital stock from \$75,000 to \$150,000, and will enlarge its plant at Winton Place.

Late press reports state that a new company composed of C. E. Freeman, F. G. Traber and A. D. Stuckey, all of Hamilton, Ohio, has purchased the Miami Foundry Company's plant at that point and will remodel it.

The Phoenix Caster Company, Hamilton, Ohio, whose plant was recently acquired by the Hooven, Owens, Rentschler Company, will move its factory to the shops of the Republic Motor Company.

The National Pretzel Company, Hamilton, Ohio, will make additions to its plant, estimated to cost \$50,000. Only special equipment will be required.

The Dayton Insulating Die Company, Dayton, Ohio, has been incorporated with \$10,000 capital stock by Arthur L. Kurz, and others. Nothing is yet known as to manufacturing plans.

The Maxwell Motor Car Company, Dayton, Ohio, in addition to improvements recently mentioned as contemplated, has decided to erect a large foundry building. Equipment details are lacking.

The Columbus Mill & Mine Supply Company, Columbus, Ohio, has acquired a large site on Marion Road on which

it will construct a structural shop and warehouses. The company's present plant is on Neilston Street.

The Morrow Mfg. Company, Wellston, Ohio, maker of mining equipment, contemplates an extensive addition to its plant. It is now installing a new engine and generator and an electric traveling crane.

It is reported that the Pennsylvania Railroad Company has had plans prepared for building a new roundhouse and repair shop at Xenia, Ohio.

C. W. Nicholson, Latham, Ohio, will equip a plant for making axe and hammer handles.

Milwaukee

MILWAUKEE, WIS., June 19, 1916.

The machine-tool business is well maintained on a steady influx of orders for single tools and small lots of standard designs and types. Automobile plants are the best purchasers of milling and planing machines. The demand for cranes is good, and builders are operating at capacity on back orders. Shops which specialize in small fine tools are several months behind on deliveries, and jobbers in mechanics' tools and instruments are complaining that the makers are still seven to eight months in arrears. A decided shortage of micrometers, calipers and similar instruments, which are in unprecedented demand, is noted.

Specifications for furnishing the State of Wisconsin with approximately 275,000 metal license plates for automobiles for 1917 are being issued by John S. Donald, Secretary of State, Madison.

The Manitowoc Shipbuilding & Dry Dock Company, Manitowoc, Wis., is constructing four large fishing trawlers, 144 ft. long and 23 ft. beam, for the Bay State Fishing Company, Boston, Mass., to be delivered about Oct. 1.

The General Welding & Mfg. Company, 330 Oregon Street, Milwaukee, is awarding contracts this week for the erection of its new brick plant, 35 x 83 ft., one-story, on Oregon near Greenbush Street. Charles J. Keller, Germania Building, is the architect.

Sealed bids will be taken until 2 p. m., June 29, by H. H. Blunden, city clerk, Menominee, Mich., for furnishing one 1,000,000-gal. and one 2,000,000-gal. turbine-driven low-service pumps, and one 75-kw. generator. Alternate bids on motor-driven low-service pumps will also be received. Specifications are by Burns & McDonnell, consulting engineers, 102 Interstate Building, Kansas City, Mo.

The John Obenberger Forge Company, Milwaukee, has engaged Klug & Smith, consulting engineers, Mack Block, Milwaukee, to prepare plans for the proposed forge and machine shop to be erected at Sixty-third Avenue and Lamham Street, West Allis. The main building will be of brick and steel, 80 x 150 ft., one story, with concrete foundation and corrugated iron roofing; the power house, 50 x 60 ft., of brick and concrete. Specifications call for two 150-hp. boilers, a 100-hp. Corliss engine, steel stack, 75-kw. generator, 10, 20 and 40-hp. motors, one 5-ton electric traveling crane, and a list of forging and machine tool equipment, not quite ready for issue. John Obenberger, 190 Northwestern Avenue, Milwaukee, is president.

The Success Milking Machine Company, Milwaukee, has been incorporated to manufacture dairy and farm equipment. The capital stock is \$15,000 and the incorporators are C. B. Harbaugh, George H. Barber and C. E. Somers.

The Rib Lake Lumber Company, Rib Lake, Wis., has awarded the general contract for the erection and equipment of an electrically driven sawmill, 60 x 240 ft., with a separate power house, to Marshall Welch, Williamsport, Pa.

The National Appliance Company, 518 Grand Avenue, Milwaukee, has been incorporated with a capital stock of \$15,000 to manufacture electric washing machines. Lee A. Dearholt, Orrin E. Grovier and Oscar F. Fischelick are stockholders.

Work is under way for the new factory of the Perfex Radiator Company, Racine, Wis. It will be of brick and mill construction, 65 x 250 ft., and equipped to manufacture automobile, tractor and truck radiators, which has been carried on in leased quarters. Much new equipment is being contracted for.

The George H. Smith Steel Casting Company, 500 Clinton Street, Milwaukee, will build a new crane runway, 28 x 100 ft.

The Corliss Motor Truck Company, Corliss, Wis., has been incorporated with a capital stock of \$100,000. Details are not yet available.

A report from Wausau, Wis., states that the Overland-Wisconsin Company, Broadway and Biddle streets, Milwaukee, State distributor of Overland cars, intends to build a branch house and service station at Wausau. An option

has been taken on a site, 60 x 120 ft., on which will be erected a four-story building. The total investment will exceed \$60,000, it is stated.

The plant and assets of the defunct American Mfg. Company, Sheboygan, Wis., manufacturer of chairs and fixtures, have been purchased at trustee's sale by Chicago attorneys, representing the officers and chief owners of the property, for \$250,000. A new corporation is being organized. The plant has been operated as a going concern since a trustee was appointed. A number of improvements are planned.

The H. G. Rapzall Company, manufacturer of blank books, 300-308 Seventh Avenue, Milwaukee, will erect a new plant, costing \$40,000, on Fifth Street, near State, of reinforced concrete and brick, two stories and basement, 70 x 150 ft. The architects are Fernekes & Cramer, Pabst Building.

The assets of the defunct Brodesser Mfg. Company, manufacturer of elevators, Milwaukee, have been purchased by Michael J. Sadek, secretary of the Progressive Metal & Refining Company, 432 Barclay Street, Milwaukee, for \$3,000.

The Perflex Radiator Company, Racine, Wis., will start work at once on a new factory building to cost \$50,000.

Cleveland

CLEVELAND, OHIO, June 19, 1916.

Several local machine-tool builders have caught up somewhat on deliveries, their increased production making the present output in excess of sales. Dealers, however, report that in many lines of standard machine tools, deliveries are no better. Some large Eastern makers of arms and munitions over-bought machinery during the rush to secure equipment and are placing these excess machines on the market causing some easing of deliveries. Among orders taken by Cleveland manufacturers the past week was one for 25 automatic screw machines for export to Russia. New demand is rather moderate, being confined largely to single tools. High prices and delayed deliveries are limiting purchases generally to machinery absolutely needed, and practically few orders are for extended future delivery. A fair demand for forging machinery is coming from automobile plants and railroads.

The Sanitary Tinning Company, Canal Road, Cleveland, has acquired a factory site in East Ninety-third Street on which it plans to erect a plant providing 8000 to 10,000 sq. ft. of floor space. It is engaged in plating work and contemplates adding dairy supplies to its products.

The American Auto Sheet Metal Company, Cleveland, has been incorporated with a capital stock of \$25,000 by W. J. Mahon, D. Gobille, W. W. Burke and others.

The Ober Mfg. Company, Chagrin Falls, Ohio, is adding to its line of wood-working machinery and plans to manufacture metal-working machinery. In order to provide increased factory space the company has disposed of its hardware line, which included sadirons, hammers, hatchets, etc., to the Reading Saddle & Mfg. Company, Reading, Pa. Some new machinery will be added.

The American Clay Machinery Company, Bucyrus, Ohio, will enlarge its plant by a brick and steel addition, 60 x 208 ft., and the erection of a storage warehouse, 60 x 178 ft.

The Mohrlite Company, Urbana, Ohio, will erect a new plant, 60 x 100 ft., doubling its present floor space. It manufactures electric lighting fixtures.

The Perfection Tube Company, Painesville, Ohio, has been incorporated with a capital stock of \$100,000 by Edward F. Hutchins, John McSweeney, W. B. Brown, E. B. Kimmell and J. English.

The Bregwoodkro Company, Lorain, Ohio, has changed its name to the Steel Products Company and is planning to move to Grafton, Ohio, and to erect a new plant. It will probably purchase shears and press equipment.

The Boos Machine Company, St. Marys, Ohio, has purchased the buildings and property formerly occupied by the St. Marys Machine Company and will put it in operation, manufacturing oil and gas engines and also maintaining a repair department for the St. Marys engines.

Indianapolis

INDIANAPOLIS, IND., June 19, 1916.

The Remy Electric Company, Anderson, Ind., has bought ground adjoining its present holdings for the purpose of extending its plant, which already occupies more than two city blocks.

The Imbler Fence & Mfg. Company, Alexandria, Ind., has elected the following officers: President, John L. Crider; vice-president, A. E. Otto; secretary-treasurer, W. R. Thomas.

The Bell Brothers Piano Company, Muncie, Ind., has begun the manufacture of talking machines.

The Federal Machine Company, South Bend, Ind., has been incorporated with \$50,000 capital stock to manufacture machinery. The directors are Joseph C. Paxton, John W. Paxton, John Martin, Fred C. Klein and George W. Zinky.

The Standard Brick Mfg. Company, Evansville, Ind., has increased its capital stock from \$50,000 to \$100,000.

The Natural Products Company, Shoals, Ind., has been organized by Chicago capitalists with \$1,500,000 capital stock. It is starting the construction of a plant for the manufacture of paving and building brick, roofing tile and artificial marble. The site of the plant was formerly occupied by the iron furnace of the Southern Indiana Coal & Iron Company.

The Auto Power Company, Laporte, Ind., has been incorporated with \$25,000 capital stock to manufacture automobiles and parts. The directors are L. H. Russell, L. Darrow and E. L. Van Dolsen.

The Veiox Spring Hub Company, Indianapolis, has been incorporated with \$30,000 capital stock to manufacture vehicle parts. The directors are F. J. Veiox, Charles Veiox and Louis P. Kern.

The Hodge Road Machine Company, Ligonier, Ind., has been incorporated with \$10,000 capital stock to manufacture road machinery, etc. The directors are Arby W. Hodge, Isaac M. Baum and Albert Daniel.

The Motor Specialty Company, Indianapolis, has been incorporated with \$10,000 capital stock to manufacture auto parts. Theodore Rees, Arthur E. Johnson and Noble H. Wible are the directors.

The Logansport Radiator Equipment Company, Logansport, Ind., has tentative plans for building a plant in the South. No definite action has been taken.

The Star Foundry & Machine Company, Anderson, Ind., the property of the estate of the late Ora Hubell, is to be sold by the executor on June 27.

Detroit

DETROIT, MICH., June 19, 1916.

Fire destroyed the main building of the plant of the Valley City Chair Company, Grand Rapids, Mich. The entire equipment was destroyed and the loss is estimated at \$150,000. The plant will be immediately rebuilt.

The Piqua Handle & Mfg. Company, Marquette, Mich., is having plans prepared for a large manufacturing plant.

The Bay City Foundry & Machine Company, Bay City, Mich., has been organized with a capital of \$100,000. John C. Ross is president.

The Nelson-Matter Furniture Company, Grand Rapids, Mich., will erect a factory building to cost \$80,000.

The Albion Bolt Company, Albion, Mich., has been incorporated with a capital stock of \$10,000 to manufacture bolts and nuts, particularly for automobile purposes. The officers of the company are president, Mark Merriman; vice-president, C. B. Hayes; secretary, Otto Schwacha, and treasurer, W. C. Morrey.

The foundry and machine shop of Castor & Son, Owasso, Mich., has been purchased by J. W. Radford, Joseph Fetter and E. W. Brown, who will continue its operation.

The Prouty & Glass Carriage Company, Wayne, Mich., will not remodel its plant for the manufacture of farm tractors as has been stated elsewhere, but will close out its business.

The Baldwin Mfg. Company, Sparta, Mich., manufacturer of standing grain threshers, would like to receive catalogs and price lists from manufacturers of machinery and iron and steel. Curtis C. Baldwin is general manager and W. H. Hall is purchasing agent.

The Central South

LOUISVILLE, KY., June 19, 1916.

Inquiries covering a wide range of territory and various industries are being received by local manufacturers of power machinery in unabated volume. Specifications are of great variety and proposals are asked with a good deal of insistence. It is also noted that inquiries originating in the immediate vicinity of Louisville are increasing. Activity continues in the machinery trade. The demand for motors and electrical tools is brisk and promising, although fan requirements have not been up to the customary mark.

The Roy C. Whayne Supply Company, Louisville, contractors' machinery and supplies, has opened a new store at 318 West Main Street.

The National Foundry & Machine Company, Louisville, announces that it is now the exclusive manufacturer of the Reilly pumps and compressors.

The Berry Harrison Garage Company, Carlisle, Ky., has been incorporated with \$5,500 capital by J. M. Berry, Joseph Harrison and Jim Harrison. It operates the Dorsey garage on Main Street.

The Hickman Wagon Works, Hickman, Ky., owned by S. L. Dodds, is to be moved to Clarksdale, Miss. The plant has been in continuous operation since 1859.

Final plans and specifications for the steam driven, electric generating station which the Kentucky River Power Company will build at Hazard, Ky., at a cost of \$200,000, have been completed and bids are being received through H. W. Saunders, Welch, W. Va. All machinery except the conveyor has been purchased. R. L. Cornell is general manager.

The Russell Creamery Company, Russell, Ky., is asking prices on one 100-hp. and one 20-hp. gas engine, deep well pump and creamery machinery. Henry S. Klein is manager.

It is reported at Jeffersonville, Ind., that the Hubbard Dry Dock Company, now operating at Point Pleasant, W. Va., is contemplating removing to Jeffersonville as a result of prolonged labor troubles.

The Fulton Company, Knoxville, Tenn., it is stated, is shortly to begin the manufacture of a special pressure reducing and regulator valve.

The Babcock Land & Lumber Company, Pittsburgh, Pa., has purchased 300 acres of timber land near Maryville, Tenn., and will establish a sawmill at Maryville, to which will be added a factory to manufacture furniture, boxes and lath. C. L. Babcock may be addressed.

H. W. Reynolds and A. D. Reynolds, Bristol, Tenn., will develop 4000 acres of manganese-iron property at Valley Forge, near Elizabethton, Tenn.

The DeCamp Glass Casket Co., 534 Bank of Commerce & Trust Building, Memphis, Tenn., with a capital of \$1,000,000, is contemplating a factory for the manufacture of glass burial caskets. J. B. Witherington is president and John D. McClanahan, secretary-treasurer.

The A. R. Humble Stave & Lumber Company, Knoxville, Tenn., has been incorporated by A. R. and H. H. Humble, J. J. Bryant and J. N. Sharp, with a capital of \$50,000.

The Exum Furniture Company, Bristol, Tenn., has been incorporated by W. J. Exum, W. J. Exum, Jr., and others, with \$50,000 capital.

Birmingham

BIRMINGHAM, ALA., June 19, 1916.

A slight falling off in the sawmill trade is noted, but mines and mills are taking a variety of appliances that constitute a normal volume of business. Electric equipment remains active. Structural operations have declined.

The Sloss-Sheffield Steel & Iron Company, Birmingham, Ala., has authorized extensions and improvements to its plant, including two steam shovels, two crushers, a jigging plant and a new ore washer at its Russellville mines; a traveling crane and a locomotive crane at its Hattie Ensley furnace at Sheffield, and four new hot-blast stoves, two for each of its plants at North Birmingham and Birmingham, to cost in all about \$197,000. The question of a by-product coke plant has been postponed for about 30 days.

The Joubert & Goslin Machine & Foundry Company, Birmingham, has been incorporated with a capital stock of \$275,000 and will take over the plant of the Payne-Joubert Company, manufacturer of sugar-house machinery, etc., New Orleans, La. Julius Goslin, Birmingham, is president. Mrs. Leon Joubert, Walter H. Cook and Fred L. Joubert, all of New Orleans, are also stockholders. No immediate plans for plant enlargement are announced.

The Long Distance Spark Plug Company, Birmingham, Ala., has been incorporated with a capital stock of \$10,000 by Selen Jacobs, H. C. Pogue and others. Its factory, located at another point, will be removed to Birmingham.

The Brunswick Copper Works, Brunswick, Ga., incorporated by C. M. Peddicord, Brunswick; W. A. McMillian, and others, of Jacksonville, with a capital stock of \$17,000, will take over and operate the plant of M. A. Baker, manufacturer of turpentine stills.

The Central Georgia Power Company, Macon, Ga., will install additional electric equipment at a cost of \$65,000 in its Ocmulgee plant.

J. C. Turberville & Sons, operating a stave plant at Jasper, Ala., will remove to Montgomery and will build on a larger scale at a cost of about \$100,000.

The Keyless Trunk Lock Company, Jacksonville, Fla., has been incorporated with a capital stock of \$100,000. It is having its recently developed keyless lock for trunk and suit cases manufactured for the present under contract in

Newark, N. J. It plans the erection of its own factory shortly, but is not prepared at this time to take up that proposition, pending its complete establishment. A. W. Stoffregen is president; J. C. Minge, vice-president, and J. T. Beal, secretary and treasurer.

St. Louis

ST. LOUIS, Mo., June 19, 1916.

The machine-tool business shows a tendency to seek the buyer, now that dealers can get hold of equipment more readily than has been the case in the past. The absorption of equipment continues good. The practically complete absence from the market of second-hand equipment is a notable feature. Little or no second-hand equipment is appearing, apparently due to the unwillingness of industries to let go of tools so long as there remains any uncertainty as to replacement. Railroads are reported as having some feelers out for fall requirements, but no specific lists.

The Almetal Mfg. Company, Clayton, Mo., a St. Louis sub-station, has increased its capital stock from \$6,000 to \$50,000 for the purpose of increasing its operations.

The Board of Public Service, St. Louis, Mo., will increase the capacity of the temporary municipal dock and install additional unloading equipment, pending the completion of the permanent dock.

The Missouri Malleable Iron Company, East St. Louis, Ill., is erecting a two-story building, to which it will remove its machine shop from its present location, so as to give it additional shipping-room facilities, and in part to enable it to comply with building regulations.

Trenton, Mo., will equip an electric light system and will require one 35 to 50-hp. oil engine, direct-connected to a 25-kw. generator, etc. A. L. Taylor is town clerk.

The Eagle White Lead Company, capitalized at \$10,000,000, has acquired the Picher Lead Company, Joplin, Mo., and all its properties, as well as those of the Eagle Company. O. S. Picher, Joplin, has been made president.

Kansas City, Mo., will install a turbine engine in its waterworks plant at an estimated cost of over \$110,000. H. P. Jackson is superintendent of waterworks.

J. F. Green, J. E. and Ross Lee, of Springfield, Mo., will equip a foundry and a machine shop at Yellville, Ark.

The St. Louis, Iron Mountain & Southern Railroad, E. A. Hadley, chief engineer, St. Louis, Mo., will build an engine house and machine shop at Texarkana.

Harrison, Ark., will equip a waterworks plant, requiring a triplex power pump, and either an oil engine or electric motor. W. O. Galbreath is engineer.

The Oklahoma Pipe Welding Company, Tulsa, Okla., has been incorporated with a capital stock of \$12,000 by D. E. Farnsworth, Jr., and others.

The Roxana Petroleum Corporation, Cushing, Okla., a subsidiary of the Royal Dutch Shell Corporation, is to equip an 8-in. pipe line 150 miles long and will also double its refinery equipment and wax plant capacity, now being constructed with 10,000 bbl. daily capacity.

The S. G. Swan Bois D'Arc Company, Idabel, Okla., has been incorporated with a capital stock of \$15,000 by S. G. Swan, J. A. Sharpe and M. L. Sharpe, and will equip a wood-working plant.

The White Cotton Press Controller Company, Granite, Okla., has been incorporated with a capital stock of \$12,000 by J. T. Alexander, William White and A. H. Downing and will equip a plant.

The Shield Carrying Saddle Company, Oklahoma City, Okla., has been incorporated with a capital stock of \$15,000 by O. G. Hancock, H. S. Baker and H. C. Schilling.

The Gorman-Head Auto Company, Oklahoma City, Okla., has been incorporated with a capital stock of \$15,000 by Charles Gorman, G. M. Head, and others.

The Tupelo Compress & Storage Company, Tupelo, Miss., has been incorporated with a capital stock of \$50,000 by J. M. Thomas, C. R. Strain, R. L. Taylor, and others, and will equip a high density cotton compress, with power plant, etc.

The Mississippi Deaf and Dumb Institute, Greenwood, Miss., will rebuild its industrial plant, recently burned with a loss of \$75,000. H. Clay Roberts is chairman of trustees.

The Harmon Lumber Company, Scooba, Miss., will equip a sawmill, the machinery to cost about \$5,000, and will also install planing mill equipment.

The Mississippi Delta Levee Board, T. G. Dabney, chief engineer, Clarksdale, Miss., is receiving bids for equipment for a pumping plant including a low-head centrifugal pump of 22,500 gal. per min. capacity, direct connected to engine, a 115-hp. horizontal return-tubular boiler, etc.

San Francisco

SAN FRANCISCO, CAL., June 13, 1916.

Conditions in the machine-tool trade are confusing. Deliveries are evidently easing up, although in some quarters they are farther off than ever. Prices in some lines are more firmly held. Most merchants report hand tools and small equipment as particularly scarce, while others claim to have ample supplies available. Local sales are of satisfactory but not abnormal volume, with few orders for more than one or two machines. Many who would like to buy decide to wait on receiving quotations, believing that prices will be lower. A lighter outside demand for second-hand tools is taken as indication of easier conditions in the East, although such equipment is still held at extreme prices here, and a good deal of it is still changing hands. The principal demand, aside from Government orders, is from shipbuilders and railroads.

Pumping machinery of all kinds, with steam, oil and electric power equipment, is in quite active demand. The oil companies continue in the market. Irrigation and waterworks business is daily becoming more of a feature. A good trade is being done in mining, smelting and logging machinery. Many new manufacturing enterprises are being started.

The Sierra & San Francisco Power Company's compressor plant at Strawberry, Cal., which was burned recently, will be restored.

Kleiber & Co., San Francisco, have started work on a motor-truck assembling plant, which has been projected for some time.

The Simmons Mfg. Company, Kenosha, Wis., is preparing to make important additions to its metal-bed manufacturing plant in this city.

The California & Hawaiian Sugar Company is building an addition to its refinery at Crockett, Cal.

The board of education, Alameda, Cal., is making arrangements to introduce machine-shop work into the high school course, and will soon be in the market for a number of tools.

R. E. Gibson and J. A. Hurley have started a boiler shop adjoining the Pacific Shipyards, Alameda, Cal.

The Campbell Machine Company, San Diego, Cal., automobile builder, is preparing to take up marine construction, and is moving its plant to the foot of Eighth Street. A water frontage of 200 ft. will be occupied and a marine ways and a wood-working shop will be built.

The Linde Air Products Company, Forty-second Street Building, New York, has let contracts for two factory buildings in Los Angeles.

The Pacific Northwest

SEATTLE, June 13, 1916.

The waterfront strikes which so effectually halted the shipping business of this section, have been amicably settled. Shippers are now striving to catch up with the volume of accumulated shipments. Bottoms are still in great demand; but this condition is being slowly remedied by the work of numerous shipbuilding plants which are working night and day.

Lumbermen of Washington and Oregon have agreed to curtail production by shutting down for one day a week to a fortnight in June and July. This does not include the July 4 closedown, when the mills quit for 10 days while mid-season repairs are made. Of the few mills who refused to curtail production, the reason given was existing contracts for delivery of spruce to Europe for aeroplane construction. General business conditions appear to be firm. The overseas commerce is growing by leaps and bounds. The fruit crop outlook is most promising.

The Perine Machinery Company, Seattle, has moved to a new and larger location at 209 First Avenue South and has added to its lines of shop equipment.

The National Home Building Company, Vancouver, Wash., has been incorporated by E. S. Cobb, Portland, and W. J. Kinney, Vancouver, with a capital stock of \$20,000. It will construct a plant in Vancouver for the manufacture of knock-down houses and boxes, and work on the first unit, to be 60 x 180 ft., will begin at once.

The Port of Portland, Ore., has instructed its supervising mechanical engineer to prepare specifications for a firebox boiler and other machinery and hull for a proposed towboat 185 ft. long.

The Motorship Construction Company, Portland, Ore., will construct a shipbuilding yard. It has contracts for four motor-driven schooners 250 ft. long, 44 ft. beam, to cost \$548,000. The incorporators are Merrill A. Reed, S. S. Hewitt and D. C. Zimmerman.

Martin Lynch, Juneau, Alaska, has recently taken over the plant of the Juneau Iron Works and installed the shop in a new building on Lower Front Street. New equipment will be added.

The Northwestern Mines Development Company, Spokane, Wash., plans to convert its smelter at Keller, Idaho, into an electrochemical plant. The smelter was built seven years ago, at a cost of \$230,000, and has never been blown in. The necessary changes will cost \$70,000.

The Wegener Mfg. Company, Tacoma, Wash., has recently been incorporated and is constructing a plant on the tidelands, where it will manufacture sectional buildings and interior sectional novelties. Charles B. Sanders will have charge of the plant.

The Rainier National Park Company, Tacoma, Wash., will begin work immediately on construction of a 250-hp. electric light plant at the National Park Inn which will cost \$10,000.

The Chaplin Furnace Company, 4317 Fifth Avenue, N. W., Seattle, owned by M. J. Chaplin, will establish a plant at the above location for manufacturing furnaces to oxidize antimony and other ores.

Canada

TORONTO, June 13, 1916.

According to the census in 1910, the manufactures of Canada in that year amounted to \$1,164,000,000. As the output of many manufacturing plants is now about 50 per cent greater than that of any previous year, and prices in many cases are more than 50 per cent higher, the value of this year's products will be fully \$2,000,000,000. In some industries a diminution in night work indicates that the apex of production has been reached, but, except in some unimportant districts, all plants are operating under pressure of accumulating orders.

It is reported that the shipment of shells to Russia this month by the Canadian Car & Foundry Company, Ltd., Montreal, will amount to \$12,000,000.

A shipbuilding syndicate represented by M. P. Cotton, Vancouver, B. C., is negotiating with the Grand Trunk Pacific Railway relative to leasing the latter's plant at Prince Rupert, B. C., for building steel freighters. An application has been made under the Government's legislation to aid shipbuilding, for assistance in building four of these ships, which will be of about 5000 tons each.

The Grand Trunk Railway Company proposes to build a roundhouse, machine shop, etc., at Lindsay, Ont., to cost \$20,000. J. D. McMillan, Belleville, Ont., is superintendent.

The Howard Smith Paper Company, Beauharnois, Que., is having plans prepared by R. S. Kelsch, Power Building, Montreal, for an addition to its power plant.

R. S. Kelsch, Power Building, Montreal, is preparing plans for the construction of new power plants for the Crabtree Paper Company, Crabtree Mills, Que., the Dominion Textile Company, Magog, Que., the Beldings-Paul-Corticelli, Ltd., 185 Shearer Street, Montreal; and the Ogilvie Flour Mills Company, Ltd., Youville Place, Montreal.

John A. Turner, city clerk, Prince George, B. C., is in the market until July 8 for power plant equipment. Specifications and instructions can be had at the office of the city clerk.

Plans have been prepared and accepted by the City Council, Outremont, Que., for a reinforced concrete community garage, to cost \$50,000. Wilfrid Duquette is in charge.

A stone-cutting plant will be erected at Point Edward, near Sarnia, Ont. The company behind the undertaking is capitalized at \$100,000. George Oakley & Son, 278 Booth Avenue, Toronto, are stockholders.

The contract for an addition to the plant of the Sheet Metal Products Company of Canada, on River Street, Toronto, has been let to Brown & Cooper, 297 Carlton Street. It will be of steel and brick construction, and cost \$6,000.

The Dominion Government Railway will build an elevator at Transcona, Man., to have a capacity of 1,000,000 bu.

An agreement is being prepared between the Grain Growers' Grain Company, Winnipeg, and the city of Port Arthur, Ont., whereby the company will build a 300,000-bu. elevator on the north waterfront to replace one recently destroyed by fire.

Fire, on June 13, caused \$150,000 damage to the plants of Lumsden Brothers and the Jersey Cream Company on McNab Street, Hamilton, Ont. The Jersey Cream Company lost \$25,000 worth of machinery.

F. Kent and J. A. Sinclair are interested in a company recently organized at Collingwood, Ont., to manufacture wood and metal specialties.

The St. John Dry Dock & Shipbuilding Company, Ltd., St. John, N. B., has been incorporated with a capital stock of

\$1,000,000, by Richard T. Heneker, Henry N. Chauvin, Harold E. Walker, and others, all of Montreal, to build drydocks, shipbuilding plants, vessels, etc.

The Dominion Tobacco Company, 94 Papineau Avenue, Montreal, is in the market for a milling machine.

M. Brennen & Sons, Hamilton, Ont., are in the market for a 40 or 50-hp. motor, a Linderman machine, a machine for boring wooden bridges in munition boxes, a dove-tailing machine, etc.

The Canada Copper Company, Vancouver, B. C., will equip the Princess Alice camp on Copper Mountain, and will spend approximately \$2,500,000 on the erection of a mill and the installation of transportation and mining equipment.

The McLaughlin Motor Car Company, Oshawa, Ont., plans to build an extensive addition to its plant.

The Chevrolet Motor Car Company, Oshawa, Ont., will soon begin the erection of an addition to its plant.

Government Purchases

WASHINGTON, D. C., June 19, 1916.

Sealed proposals will be received until 2 p. m. June 23 at the Bureau of Standards, Washington, for furnishing and installing one railroad master scale of either the flexure-plate or knife-edge type, from specifications obtainable at the bureau.

The general purchasing officer of the Panama Canal, Washington, will receive proposals until 10:30 a. m., July 7, under Panama circular 1055, for a pipe-threading machine.

Bids were received at the Bureau of Supplies and Accounts, Navy Department, Washington, June 13, for furnishing supplies for the naval service as follows:

Schedule 9624. Construction and Repair

Class 1, Puget Sound—One planing and matching machine—Bid 145, \$6,864; 157, \$5,063.05; 165, \$5,611.85; 167, \$5,224. Alternate—Same f.o.b. works—Bid 145, \$6,364.

Schedule 9625, Steam Engineering

Class 11, Puget Sound—One bolt-threading machine—Bid 65, \$2,110; 101, \$1,300 and \$1,770.

Alternate—Same, f.o.b. works—Bid 65, \$1,935.

Class 12, Puget Sound—One precision lathe—Bid 85, \$502.80.

Alternate—Same, f.o.b. works—Bid 85, \$484.80

Class 13, Puget Sound—One precision lathe—Bid 85, \$527.80.

Schedule 9676, Steam Engineering

Class 141, Philadelphia—One set main propelling engines—No bids.

Alternate—Same, two turbines, complete, either impulse or reaction—No bids.

Class 142, Brooklyn—One set of main propelling engines—No bids.

Alternate—Same, two turbines—No bids.

Class 143, Boston—Two turbines, direct-connected impulse type—No bids.

Alternate B—Same, with geared cruising turbines—No bids.

Alternate C—Same, with mechanical reduction gear and thrust bearings—No bids.

Schedule 9695, Construction and Repair

Class 151, Brooklyn—One high-speed steam hydraulic forging press—Bid 13, \$37,950; 101, \$45,740; 147, \$35,500.

Alternate A—Same equipped with hydraulic mandrel and manipulating gear—Bid 13, \$59,800; 147, \$54,351.

Alternate B—Same, without hydraulic mandrel and manipulating gear—Bid 13, \$40,975; 147, \$43,170.

Schedule 9712, Construction and Repair

Class 231, Various deliveries—Abrasive wheels—No bids.

The names of the bidders and the numbers under which they are designated in the above list, are as follows:

Bid 18, Bethlehem Steel Company; 65, Hallidie Machinery Company; 85, Kemp Machinery Company; 101, Manning, Maxwell & Moore, Inc.; 145, Universal Trading Company; 147, United Engineering & Foundry Company; 157, S. A. Woods Machine Company; 165, P. B. Yates Machine Company; 167, American Woodworking Machinery Company.

Bids will be received* by the Bureau of Supplies and Accounts, Navy Department, Washington, until June 27, schedule 9787, for one pipe-threading machine, for Brooklyn; schedule 9788, for one 2,000,000-lb. chain-testing machine for Boston; for the following equipment, opening date not set—schedule 9796, four turbo-generating sets for Norfolk; schedule 9801, one 4-in. radial drilling machine and one 5-ton electric hoist jib crane, both for Charleston; schedule 9803, two 40-ft. motor-boat gasoline engines for Portsmouth; schedule 9806, two 1200-lb. drop hammers and two trimming presses for drop forgings, all for Brooklyn; schedule 9807, one 1/2-in. sensitive drill, two 800-lb. single stand hammers, two buffing lathes, one 6-spindle drill press and one 21-in. upright drill press, all for Portsmouth.

*Annual guarantees for the fiscal year 1916 will not cover bids opening after June 30, 1916.

NEW TRADE PUBLICATIONS

Oil Engines and Pumps.—National Transit Pump & Machine Company, Oil City, Pa. Three folders. In two of the folders illustrations and descriptive matter explain the operation of a line of internal combustion engines, using oil or gas as fuel. A number of applications of the oil engines are illustrated with brief statements of the cost of operation. The third folder contains a list of the various sizes and styles of pumps and engines that are carried in stock at the present time. These are grouped according to the different styles with the different sizes listed underneath and the number now in stock.

Oil Filters.—Richardson-Phenix Company, Milwaukee, Wis. Bulletin No. 5. Describes a complete line of filters for purifying lubricating oil in quantities ranging from 35 gal. per day to 50,000 gal. per hour. Among the filters shown is a special unit having an hourly capacity of 22,500 gal. for use in purifying the lubricating oil from waterwheel thrust bearings in a hydroelectric plant and another for use on large gas engines in a steel mill. The filters are made in portable, round and square types and also in large stationary units constructed of heavy steel plates, the connection for the latter in some cases being for a pipe 10 in. in diameter. Illustrations of the various types of filters are presented, and in most cases drawings showing the interior construction are included.

Baling Presses.—Woodall Mfg. Company, Davenport, Iowa. Folder. Mentions a line of portable and stationary baling presses for waste paper which are made in a number of different styles. Illustrations and brief descriptions of the various presses are presented and a brief statement of the advantages of baling the waste around factories, office buildings, etc., is included.

Planing Machines.—Cincinnati Planer Company, Cincinnati, Ohio. Booklet. Presents by a series of illustrations and brief descriptions the history of the planing machine from its inception in 1751, step by step, from the crude design to the highly developed machine of the present day. Views of the various early types trace in logical order the progress shown in construction. Two pages are used in each case, the one at the left containing an engraving and brief description of the early type of machine, while the facing one has the same arrangement for a modern machine tool. In addition to the historical matter, the various stages in the development of the machines built by this company are presented in the same way.

Gravity Spiral Chutes.—Minnesota Manufacturers' Association, North St. Paul, Minn. Folder. Covers the use of a gravity spiral chute for handling boxes and packages in warehouses and industrial establishments of all kinds and conveying them to the lower floor of a building. One side of the folder contains a series of illustrations showing a conveyor installed in a five-story warehouse, while the views on the other side show applications of the system to a number of different classes of manufacturing plants.

Tanks.—Wm. B. Scaife & Sons Company, Pittsburgh, Pa. Two bulletins. The first relates to a line of copper-brazed, high-pressure tanks for air, gas and liquids, while the second deals with pneumatic tanks for domestic water supply systems and water storage tanks. In both bulletins engravings of the different tanks are presented with descriptions of their construction, tables of specifications, etc. A table giving the capacities of cylinders of various diameters and lengths is included.

Shell Waving and Undercutting Machine.—Thurlow Steel Works, Inc., 1418 Walnut Street, Philadelphia, Pa. Circular. Treats of a special machine for waving and undercutting projectiles. A general description of the construction and operation of the machine, which employs four tools, two for undercutting, one for waving and the last for cutting the radius on the end of the shell, is presented and an engraving and brief table of specifications are included.

Steel Pulleys.—Medart Patent Pulley Company, St. Louis, Mo. Folder. Concerned with a steel pulley for heavy duty work that is made with either single or double arms in the split and solid types. Engravings of the pulley, which was illustrated in *THE IRON AGE*, Jan. 20, 1916, are presented, with a brief description of the construction.

Fine Tools.—L. S. Starrett Company, Athol, Mass. Catalog No. 21. Size, 5 1/4 x 7 1/2 in.; pages, 336. Covers a complete line of fine tools for mechanics including steel and wood rules, steel squares, protractors, calipers, height and surface gages, hack saw frames, pliers, punches, speed indicators, dividers, screwdrivers, drill and wire gages, etc. Illustrations and brief descriptions of the tools are presented with tables

of the sizes that can be supplied. A number of tables of useful information are included, together with numerical and alphabetical indexes of the catalog numbers and the lines covered.

Engine Indicators.—Trill Indicator Company, Corry, Pa. Booklet. Size, 6 x 9 in.; pages, 56. Illustrates and describes in detail the construction and purpose of the several parts of both the outside and inclosed spring types of indicators including the indicator reducing motion. Space is given to a discussion of indicator springs with data on the scales recommended for various steam pressures and complete instructions on indicating and interpreting cards from all types of engines and ammonia compressors are included. Characteristic diagrams from various types of engines are presented and discussed, together with a large number of faulty diagrams showing the characteristic defects of engines.

Forging Machines.—National Machinery Company, Tiffin, Ohio. Forging machine talk No. 12. Points out the advantages of using the forging machine as a substitute for the drop or steam hammer in producing accurate work. Illustrations and a brief description of a somewhat unusual die forging job, that of making the race or outer cup for a roller bearing, are included.

Tacks and Small Nails.—Atlas Tack Company, Fairhaven, Mass. Catalog. Illustrates and describes briefly an extensive line of tacks and small nails for all purposes. Engravings of the several sizes that can be supplied of each type are presented, together with a list of the various finishes. Illustrations of staples, rivets and eyelets are also presented, a number of dimension tables and diagrams being given in the case of the rivets. Mention is made of the special goods that can be furnished in any of the lines shown, and a number of engravings of special wire nails and rivets are included.

Humidifying Apparatus.—Carrier Engineering Corporation, 39 Cortlandt Street, New York City. Bulletin No. 100. Explains briefly such details as air supply, fixing the amount of water vapor, heating, cooling, securing various humidities from one apparatus, air distributing systems based on ordinary galvanized iron ducts, interior risers, hollow pilasters, central vertical flues, automatic dew point control, proportioning fresh and return air, etc. Detailed descriptions of the features of the Carrier humidifier such as spray chamber, piping and nozzles, water pumping, heating and straining methods, air distributing baffles, fan, water eliminating baffles, fresh and return air dampers, compressed air system and safety valves for operating the dew point control, etc., are included. The descriptive matter is supplemented by engravings of various portions of the apparatus and views of installations.

Refillable Cartridge Fuses.—Economy Fuse & Mfg. Company, Kinzie and Orleans streets, Chicago, Ill. Folder. Gives some idea of the extensive use made of the fuses by reproducing portions of the order blanks that have been received from industrial establishments of all kinds. Reproductions of letters of approval of the various municipal and insurance inspection departments are included and emphasis is laid on the repeat orders that are received by showing a group of some 200 orders that have been placed by the Carnegie Steel Company.

Spring Banding Press.—Joseph T. Ryerson & Son, Chicago, Ill. Circular No. 20,105. Presents an illustration and brief description of a pneumatic spring banding press for use in railroad and commercial spring manufacturing and repair shops. The machine is operated by compressed air, thus making it possible to handle work in shops where hydraulic power is not available. Horizontal and vertical rams are employed to exert the pressure on the spring band, gages being provided to indicate the amount that is being exerted. An illustrated description of the press appeared in THE IRON AGE, Feb. 3, 1916.

Cranes, Bridges, etc.—Dominion Bridge Company, Ltd., Montreal, Canada. Concerned with the work done by the mechanical department of the company which includes cranes of the hand and power traveling, revolving and derrick types, movable steel dams or flow regulating gates, bridges and hydraulic lift locks for canals. Illustrations of some of the work that has been done are presented together with partial lists of firms for whom cranes have been built.

Metal Sheets and Culverts.—American Rolling Mill Company, Middletown, Ohio. Pamphlet. Describes in Spanish the varied uses of Armco sheets for culverts. Special attention is called to the durability of this brand of sheet metal and the knock-down culverts manufactured from it particularly for the export trade. Tables of weights and dimensions required by exporters and importers are given.

Expansion Bolts.—Isaac Church, East Norwalk, Conn. Catalog. Deals with several types of expansion bolts, screw eyes and awning hinges. In every case the construction is described by one or more halftone engravings and brief state-

ments of the construction of the bolts and the uses to which they may be put are given. Tables of the sizes in which the different bolts can be supplied are included and mention is made of an anchor or toggle bolt and a line of brass expansion bolts.

Microscopes.—Bausch & Lomb Optical Company, Rochester, N. Y. Catalog. Deals with a line of microscopes and apparatus which includes triple and compound microscopes for use for general, metallurgical, chemical and petrographical work. After a general description of the mechanical construction of the instrument, illustrations and brief descriptions of the different types are presented. The accessories listed include condensers, cover glasses, object slides, slide boxes and cabinets, etc.

Sewage Ejectors and Centrifugal Pumps.—Yeomans Brothers Company, 231 Institute Place, Chicago, Ill. Two bulletins. The first, No. E-2000, contains illustrations and descriptive matter explaining the operation of a duplex electric centrifugal sewage ejector for automatically raising sewage and drainage in basements below the street sewer level. A list of the standard sizes and dimension diagrams and tables are included. The other bulletin, No. M-1000, mentions a line of small electrically driven centrifugal pumps for house supply and general service in industrial and power plants. Drawings showing the various combinations of single and double stage pumps which can be supplied are given, together with a condensed table of specifications.

Metal Working Machinery.—Davis Machine Tool Company, Inc., Rochester, N. Y. Catalog. Relates to a line of metal working machinery which includes engine, turret and toolroom lathes, cutting-off, keyseating, shaping and drilling machines, etc. A separate page is devoted to each machine, an engraving, condensed table of specifications and brief description being presented in each case.

Roller Bearings.—George Automatic Roller Bearing Company, 4614 Spring Grove Avenue, Cincinnati, Ohio. Booklet. Describes and illustrates a roller bearing, an illustrated description of which appeared in THE IRON AGE, Feb. 10, 1916. The special feature of the bearing is the use of tapered rollers in conjunction with balls at either end to give an automatic adjustment to compensate for variations in the actual diameter of the rollers. A number of mountings of the bearing are illustrated and a view showing the method of disassembling the bearing for inspection, cleaning, etc., is included.

Grinding Wheels and Machinery.—Norton Company, Worcester, Mass. Catalog. Size, 6 x 9 in.; pages, 161. Treats of a line of grinding wheels and the machines on which they are used. After a brief description of the company's two abrasives, Alundum and Crystolon, which is supplemented by views showing various stages in the manufacture of the material, the various forms of wheels that can be supplied are illustrated and the principal dimensions given. The subjects of grain and grade are explained, with a table showing the various grades that are best adapted for different classes of work. Instructions on mounting the wheels are presented and illustrations of various materials that have been finished with the wheels given. Engravings and brief descriptions of the different types of grinding machines in general use are included, and a list of dealers and alphabetical indexes of subjects and grinding wheel shapes complete the catalog.

Metal Wheels and Trucks.—Havana Metal Wheel Company, Havana, Ill. Catalog No. G21. Contains illustrations and brief descriptions of an extensive line of trucks equipped with metal wheels. These trucks are used for a great variety of purposes, both in industrial establishments and on farms. Among those shown that are suitable for factory use are pickup, barrel, basket, box and cable reel carts, a number of different styles of hand trucks and several designs suitable for mounting internal combustion engines.

Heat Treating Furnaces.—Metals Production Equipment Company, 105 West Fortieth Street, New York City. Bulletin No. 2, second edition. Contains illustrations and a brief description of an over-fired heat treating furnace using oil or gas as fuel. It is especially designed for heating material for heat treatment, annealing, hardening, tempering, carbonizing, etc., where a uniform and controllable temperature is required. The illustrations for the most part are those of actual installations showing the apparatus in use for handling a variety of material, and these are supplemented by a drawing, partly in section, showing the interior construction of the furnace and a table of the dimensions of the various sizes that can be furnished.

Storage Battery Truck.—Buda Company, Chicago, Ill. Leaflet. Illustrates two types of trucks steering on all four wheels. Both elevating and non-elevating trucks with a low platform are shown and brief descriptions and condensed specification tables supplement the engravings.

